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SYMPOSIUM

EVALUATION OF ROENTGENOLOGY IN OTOLARYNGOLOGY.

I.—THE TEETH IN RELATION TO OTO-RHINOLOGY.*

DR. S. FINEMAN, New York.

The Roentgenologist can frequently offer invaluable aid to the oto-rhinologist in demonstrating the dental origin of the symptoms and disease in some of the obscure and baffling cases. Direct extension of dental or alveolar disease into the ear occurs rarely. Ear symptoms of dental origin are usually reflex in character and are the result of impaction, infection, malposition and encystment of the posterior teeth. On the other hand, the nose and paranasal sinuses are much more frequently affected by direct extension of disease originating in the teeth and peridental tissues.

I shall now show some slides illustrative of some pathologic conditions of the sinuses of dental origin. In practically all instances the final diagnosis was proven by operation or biopsy.

1. *Apical Granulomas:* Frequently the upper posterior teeth are separated from the antral floors by a very thin layer of bone (slide).

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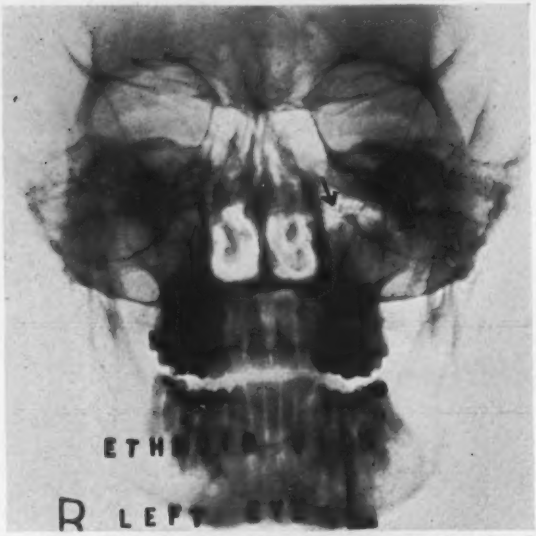

Fig. 1. Antral infection of dental origin. At operation, Dr. Lee Hurd found that the left antrum was nearly filled with a large polypoid mass originating apparently from an apical granuloma. The floor of the right antrum showed marked softening over the apices of a devitalized molar. The cavity was filled with a thick, stringy mucopurulent exudate.

Fig. 2. Antral cyst of dental origin showing the development of a thick layer of bone within the cyst wall. Patient operated upon by Dr. Theodor Blum.

Fig. 3. Cyst of dental origin in right antrum which yielded the characteristic notched cholesterin crystals. Patient of Dr. Lee Hurd.

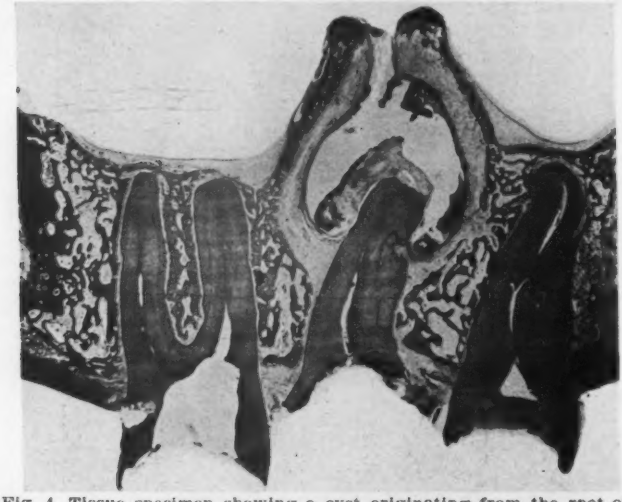

Fig. 4. Tissue specimen showing a cyst originating from the root of an infected broken tooth. The cyst is partially within the antrum and communicates with the antral cavity. The wall of the cyst contains a bony layer of tissue. The mucosal lining of the cyst is derived partially from the epithelial cells of the peridental tissues and in part from the antral mucosa which grew into the cyst through the communicating opening. This slide is from the collection of Dr. Rudolph Kronfeld and is shown through the courtesy of Dr. Theodor Blum.

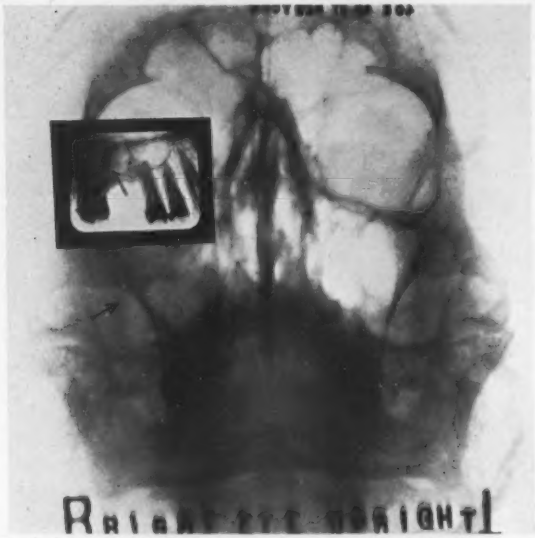

Fig. 5. Antral infection of four years' duration following removal of a right upper molar. At operation, Dr. Theodor Blum found a dental root in the right antrum. The antral cavity was filled with polypoid tissue, pus and a markedly thickened mucous membrane.

Fig. 6. An entire molar forced into the right antral cavity during attempted extraction. Antral infection followed. The patient was referred to Dr. Theodor Blum, who opened the antrum and removed the tooth.

Fig. 7. A benign, slowly growing osteoma of alveolar origin invading the left antrum with partial destruction of the antral walls through pressure atrophy.

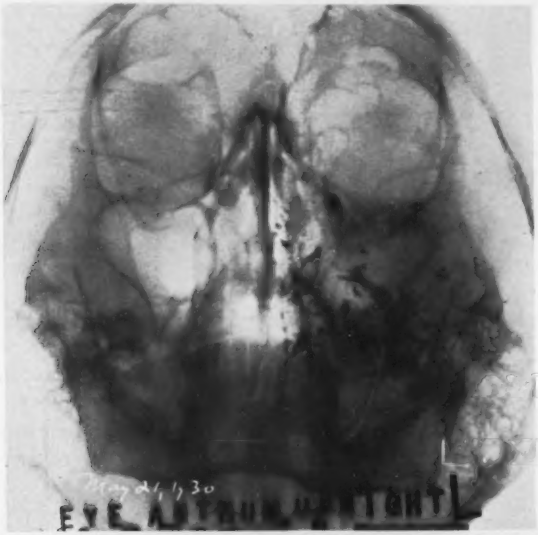

Fig. 8. Carcinoma of the alveolus invading the antrum. The antral cavity is almost obliterated by the growing mass as shown by lipiodol injection. The bony walls present a moth-eaten appearance. Diagnosis confirmed by exploratory operation by Dr. Lee Hurd.

In many cases the roots of these teeth invaginate the antral floors very deeply. The teeth usually related to the antral floors are the molars and second bicuspids. However, the first bicuspids, cuspids and even the incisors may come into similar relationship with the antral floors when the antra are large and extend well forward. Infection at the roots of these teeth may cause softening of the antral floor, with extension of the infection into the antrum. The antral changes may be in the form of mucopurulent exudate, polypoid, granulomatous or cystic changes (slide) (see Fig. 1).

Fig. 9. The same case. Lateral view after lipiodol injection showing fistulous tract from alveolus into antrum.

2. Trauma or Fracture of the Antral Floor: Where the roots of infected teeth are separated from the antral cavity by a thin layer of bone, the antrum may become easily infected as a result of traumatization or fracture of the antral floor during dental extraction. A bony sequestrum or broken off dental root located under the traumatized antral floor or within the antral cavity may maintain a sinus infection for very long periods of time unless the origin of the infection is recognized and the root or sequestrum removed. In cases of this type, Roentgenograms usually reveal the root or bony sequestrum. Where a break through the antral floor has occurred,

an injection of lipiodol into the antrum may demonstrate the fistulous tract through the antral floor.

3. Dental Cysts: Dental cysts are of two types. Those which form around malposed, unerupted or supernumerary teeth and those which originate from apical granulomas. These cysts may develop to such a degree as to deform the antrum and the nasal floor and walls as a result of mechanical pressure. Cysts arising from apical granulomas may invade the canine fossa or antrum.

In both these types, the cyst wall consists of a fibrous capsule of varying thickness and may also contain a layer of bony tissue (see Fig. 2). The cyst cavity is usually filled with yellowish fluid and characteristic rectangular-shaped cholesterin crystals (see Fig. 3). The finding of these crystals in fluid obtained from the antrum is indicative of the presence of a dentigerous cyst. The inner surface of the cyst wall may be lined with a layer of epithelial cells arising from the peridental membrane. As a rule, the cyst contents are sterile and there is no communication between the cyst and the antral cavity. At times an acute infection develops with the formation of pus, tissue debris and bacterial growth. Such an infective process may break down the cyst wall, which is the point of least resistance, with spread of the infection to the entire antrum. In such cases, the epithelial lining of the antrum may grow down into the cyst through the break in the cyst wall (slide) (see Fig. 4).

4. Foreign Bodies: Broken off bits of dental instruments, portions of a tooth (slide) or even an entire tooth (slide) (see Fig. 6) may inadvertently be pushed into the antral cavity. These accidents are usually followed by infection of the antrum and necessitate the removal of the foreign body. Stereoscopic films of the sinuses are very valuable in localizing these foreign bodies (slides).

5. Osteomyelitis: Osteomyelitis of the alveolus may extend to the floor and walls of the antrum (slide). The antral infection is maintained over long periods of time by retention of bony sequestra. The Roentgenologic demonstration and the localization of these is of material aid in the treatment of the case.

6. Tumors: The nasal accessory sinuses are often involved in tumor growths originating in the upper alveolus. The benign, slowly growing osteomas may erode and destroy the bony walls of the antra and adjacent nasal structures merely as a result of pressure trauma (slide) (see Fig. 7). The malignant types of tumors arising in the gums, palate and alveolus may also extend into the nose, sinuses and adjacent structures. The most common type is carcinoma which

is thought to originate in the soft tissues of the gum as the result of chronic irritation from ill-fitting artificial denture. In these cases lipiodol injection of the antrum often shows an almost complete filling of the antral cavity with the malignant tissue and may disclose occasionally a fistulous tract from the alveolus to the antral cavity (slide) (see Figs. 8 and 9). In these cases, as well as in the sarcomatous types of antral and alveolar disease, stereoscopic Roentgenograms disclose a moth-eaten appearance or areas of destruction in the bony tissues.

From this brief survey of the subject, it is evident that Roentgenograms of the sinuses and peridental structures are of great value in clarifying a few of the obscure clinical problems of the oto-rhinologist.

133 East 58th Street.

EVALUATION OF ROENTGENOLOGY IN OTO-LARYNGOLOGY.

II.—SINUSES.*

DR. FREDERICK M. LAW, New York.

In the few moments at my disposal I shall be able to touch on only two points which are essential for the proper interpretation of sinus films.

The basis of correct interpretation rests entirely with the technique of production. If the films are not made with the strictest attention to the proper technique, no roentgenologist or surgeon can make a satisfactory interpretation. There are many factors which enter into the production of sinus films, the most important of which are the proper degree of contrast and the securing of the finest possible detail.

When I speak of contrast I do not mean the intense black and white films which are sometimes exhibited. Too much contrast, while making a pretty film, is liable to burn out some of the softer tissues, such as a thickened membrane. The ideal film is one which shows just enough contrast to distinguish between a normal sinus and one in which there is the faintest change in comparison.

Too thin a film will show too much difference, due to the different thicknesses of the bony walls. This is especially marked in the variations of the floor of the occipital bone which shows through the antra on the 23° film, or the view in which the image of the petrous bone is projected across the orbits.

If all rhinologists would visit the X-ray laboratory and become familiar with the proper degree of density, it might be possible to settle on a standard technique and, barring the variations of bone density which influences exposure time, arrive at a decision that will make for standardization, and then all films made in different laboratories would be similar.

There is not sufficient consultation between the roentgenologist and the rhinologist.

The other factor which is absolutely essential is the detail shown on a film. The head must be immobilized and the films must show the finest of bony structures as represented by the walls of the ethmoidal cells. These cell walls show chronic sinusitis in the absence of any occlusion of the ethmoids as viewed on the anteroposterior view. I cannot bear too strongly on this factor of detail. It is the one most often neglected and is the most important for correct interpretation.

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There is one other factor which is essential, *viz.*, films made at different angles. So many times a surgeon will submit one or two films and ask for an interpretation. This is an impossibility. For proper interpretation, one must have films made in the 23° angle, the Waters view, the vertex mental view and the lateral. It is imperative that the lateral views be made stereoscopically, and I insist on all views being so made. These should be routine positions and others at different angles to supplement them, in exceptional cases.

Radio opaque injections are becoming very popular, and for diagnostic purposes are sometimes essential, but if the proper study is made of stereoscopic films and the rhinologist becomes familiar with the appreciation of the third dimension, many cases of polyp and granulations can be determined without the trouble and expense of injecting an opaque oil, although they do make very spectacular demonstrations.

Unfortunately, many surgeons cannot use the stereoscope, and cannot appreciate the enormous advantage of a view in the third dimension. I would urge you all to become proficient in the use of this valuable instrument.

I am not going to bother you with slides showing gross pathology as registered by an opaque sinus, but I will show you the changes which occur in the bony walls of the ethmoid cells. Inflammatory changes are shown as a change in the roentgen appearance of these fine bony structures before any important change can be seen in the examination of the nose. These changes are seen in chronic cases and the microscope has confirmed the roentgen appearance.

Specimens have been removed from cases which had been X-rayed and reported on. Dr. Eggston has made a very exhaustive examination on these specimens and described them in his excellent monograph on sinus pathology, and his report has confirmed the report of the roentgenologist.

The normal ethmoid capsule should show clear-cut walls with no break in their contour and a definite uniform thickness. The pathology is shown on a film as edema, absorption or rarefying osteitis and condensing osteitis. These processes may be in combination.

In this short time I cannot enter into a lengthy discussion of these changes but I will show a slide to illustrate each change.

The object of my talk is to urge you all to study your films stereoscopically and consult with the roentgenologist so that we may all appreciate each other's difficulties and by co-operation be able to speak each other's language.

140 East 54th Street.

EVALUATION OF ROENTGENOLOGY IN OTO-LARYNGOLOGY.

III.—MASTOID.*

Dr. George Sloan Dixon, New York.

In considering the value of Roentgenological examinations of the mastoid process, it is well to remember its variations, developmental and residual. No two mastoids were ever identical, and probably never will be. If we had only to deal with the classical pneumatic bone the detection of pathological changes would be comparatively easy. We would not have to rely on comparison with the opposite side in borderline cases to so great an extent. But instead of one type, there are four: the infantile, the pneumatic, the diploetic and sclerosed. Some of these might be divided into sub-types, as their combinations are numerous.

We may find the typical infantile bone with forward sinus, and all the cells in the petrous at any age, and frequently on one side only, while the other side may be either of the other three, or a combination of them.

In passing, mention may be made of the so-called "double-deck" bone, in which the cells are on two levels, and when infected the process may be found in one layer only.

The vagaries of the normal pneumatic mastoid are numerous. We may find the classical cellular development, that is, the small cells above and the lower cells increasing in size toward the tip with the not unusual large tip cell, or the cellular arrangement may be reversed. The antrum may be excavated or not. The zygomatic group may split the squama to almost its fullest extent with more cells in front of the antrum than behind. The cells of the mastoid proper may cross the masto-occipital suture and split the occipital bone well back toward the torcula. Dr. Law has described such an occurrence. The sinus groove may be forward and cut the petrous or it may be shallow and well back.

All types and their variations, except the "double-deck" bone, can be distinctly shown. Even this type may be suspected if the clinical symptoms are carefully recorded.

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But if nothing but the location of the sinus and size and location of the mastoid emissary vein could be determined by the use of the X-ray, it would be well worth while to skiagraph every infected mastoid. This is routine practice at the New York Eye and Ear Infirmary, as elsewhere.

Stereoscopic exposures of the mastoid are interesting from an artistic point of view, but in the vast majority of instances give no more information than a single film.

In acute infections of the mastoid the cells early become hazy to cloudy, depending largely on the pressure, and, while as stated above, no two mastoids are exactly alike on the two sides, there is usually a general similarity which assists in properly reading the skiagraph of the affected side. If both mastoids should happen to be involved, the reading then becomes more difficult, but as a rule the more urgent side can be determined from the X-ray appearance alone. As the disease advances the mastoid will become progressively cloudy, which is readily shown by repeated exposures.

Abscess cavities will be indicated by dark areas in locations which should be the reverse, but they are sometimes obscured by a thick, dense cortex.

It should always be borne in mind, however, that normally there is a thin area over the knee of the sinus which occasionally simulates an abscess cavity.

The first indication of a beginning cavity in cellular bones is a localized change in the appearance of the septa. They become blurred, less distinct than those in the vicinity, indicating softening, and then disappear and, offering less obstruction to the ray, cause the area to become dark instead of gray, and may occasionally be black.

Pneumococcus, streptococcus and staphylococcus mastoid infections exhibit much the same X-ray appearance, but pneumococcus iii (formerly termed streptococcus mucosus capsulatus) generally shows a definite, typical picture, especially if the case is more than two weeks old at the time of X-ray exposure. In these cases all detail is likely to be lost. There is an appearance of general softening, so that frequently the germ may be judged present without much knowledge of the clinical history.

In the old O.M.P.C. cases sclerosis has occurred, and it is the rule for the cells to be obliterated and the image of the mastoid white and without detail. Cholesteatomata appear very frequently in these bones, and probably are the easiest of the affections to recognize in the skiagraph on account of their smooth, clear-cut walls. However,

a small one may be obscured by a thick, dense cortex. These degenerations may be small and multiple, or destroy the entire mastoid.

In traumatic cases the line of fracture through the temporal bone can generally be shown. The mastoid cells are generally filled with blood, and hence are cloudy. A peculiar thing in our experience has been that the fracture is likely to show as double parallel lines running more or less perpendicular through the squama down into the mastoid. It is to be noted if there is no infection demonstrable by examination of the discharge from the canal, it is the rule for them to recover without operation. It is often impossible to show a fracture at the base of the skull through the mastoid, though we are absolutely certain clinically that a fracture has occurred.

Fortunately, tumors involving the internal structure of the mastoid are very rare, but osteomata of the mastoid cortex are fairly common. They seldom extend deeper than the inner layer of the cortex.

Occasionally, sequestra may be detected in chronic suppurating mastoids.

The X-ray not infrequently becomes very useful in cases of secondary mastoiditis by showing a group of cells missed during the original operation. An unusually interesting case of this nature occurred in the practice of Dr. Atkins some time ago. A simple mastoid operation had been performed elsewhere; the patient did not do well, and a skiagraph, which had been made outside of New York, but in the possession of the patient, indicated an enormous zygomatic cellular development and, though very cloudy, for some reason was not opened by the former operator. An uneventful recovery followed the second operation.

The ideal procedure, especially in cases with a tendency to middle ear infection, would be to skiagraph the mastoid between attacks—during a period of quiet. It has been our practice to skiagraph our X-ray employees (and others if they wish it), whether they have ever had middle ear infection or not, in order to have a record on file. These films are invaluable in the event of subsequent infection; but to suggest this as a general procedure would most certainly be misunderstood.

We skiagraph every suspected mastoid at the Infirmary, as well as the opposite side, which is the rule everywhere, or ought to be if done at all, and as only one side is usually involved, the record of the opposite side has repeatedly proven invaluable for subsequent comparison.

The time at my disposal will not permit any extended discussion of this very important diagnostic adjunct. Its value is proven daily but it is not to be regarded as infallible when considered alone. Unless a pathognomonic element is present it is only one, but a very important point in diagnosis.

As my old friend, Dr. Gruening, used to say, "Gentlemen, you must not forget the clinical symptoms."

In conclusion, gentlemen, permit another plea for more co-operation between the surgeon and the Roentgenologist. We realize that the surgeon is often pressed for time, that his mind is busy mapping out the line of attack on his difficult cases, but so much responsibility should not be placed on the Roentgenologist without discussion before operation.

I do not know how it is with other men, but reports on the results in private cases are rare in my practice. I suppose that should be regarded as a good omen, but, nevertheless, it would be much more satisfactory to know just what happened in the more important cases at least.

218 Second Avenue.

EVALUATION OF ROENTGENOLOGY IN OTO-LARYNGOLOGY.

IV.—THE LARYNX.*†

Dr. Ross Golden, New York.

The shadows of certain structures in the larynx are visible on an X-ray film by virtue of two facts: *1.* the calcification of the laryngeal cartilages, and *2.* the presence of air in the lumen of the larynx, a medium of low density upon which certain soft tissue prominences may be projected.

Within a year after Roentgen's discovery, Scheier began to study the larynx by means of the X-ray and read a paper on the calcification of the cartilages in 1896. He, and later Fränkel, showed that calcification or ossification of the laryngeal cartilages, which had previously been thought to be a senile change beginning in the fifth decade of life, was really a physiological process beginning before the end of the second decade. They believed it to be an orderly process within certain limits, with characteristic differences in the two sexes, and attempted to formulate so-called "laws" concerning its development. Thost (1913) pointed out quite correctly that the variations from the usual picture were so frequent and marked that no laws could be accepted as valid.

There are, however, certain tendencies in the development of this calcification which in general hold true. The calcification of the thyroid cartilage begins in its postero-inferior part, involves the lower horns and spreads anteriorly along the lower border. Later, especially in males, it extends upward to the superior horns and along the upper margin, frequently leaving uncalcified areas in the anterior part of the ala and along the upper margin. As pointed out by Brown and Reineke, the calcium in the female larynx is likely to be laid down in dense spots, while in the male it is likely to be more diffuse and to form a trabecular structure like cancellous bone. It is rarely if ever complete in the female and may not be in the male. It may not be symmetrical on the two sides.

Technique: Roentgen studies of the larynx in life have been made exclusively in the lateral projection. Hay recommends the upright position with the patient's shoulder against the cassette holder. This position includes all of the pharynx and the trachea down to the thoracic inlet. Because of the distance between the neck

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†From the Roentgen Ray Department of the Presbyterian Hospital and the Department of Medicine of Columbia University College of Physicians and Surgeons.

and the film, this method sacrifices a certain amount of detail in the shadows. Admitting the importance of including the entire neck in the examination, I nevertheless believe it advisable to take an additional film with a small cassette placed close to the neck to improve the detail of the shadows of the calcified cartilage. Recently we have been studying the larynx in right and left oblique positions, which separate to a certain extent the structures on the two sides. The practical value of these oblique positions has yet to be determined. The exposure should be as short as practicable, preferably not longer than one-thirtieth of a second, to avoid the blurring effect of slight movements transmitted from the pulsations of neighboring blood

Lateral view of the normal larynx of a 40-year-old woman to show certain anatomical landmarks visible on the Roentgenogram (specimen removed at autopsy). 1. Epiglottis. 2. Lesser horns of hyoid. 3. Epiglottic valleculae. 4. Body of hyoid. 5. Aryepiglottic folds faintly outlined. 6. Arytenoid prominences. 7. Superior horn of thyroid cartilage. 8. Base of epiglottis. 9. Laryngeal vestibule outlined by air and partially obscured by the calcified thyroid cartilage. 10. Ventricles outlined by air between the ventricular fold above and the vocal cord below. 11. Partially calcified alae of the thyroid cartilage. 12. Calcified base of arytenoid cartilage (dense boot-shaped shadow). 13. Inferior horns of thyroid. 14. Cricoid cartilage. 15. Calcified rings of the trachea.

vessels. Our best films have been produced in one-thirtieth of a second with 1,000 ma., 40-50 K. V. (three-phase current) and 6-foot target film distance.

PATHOLOGICAL CONDITIONS.

Thost (1913), Iglauer (1914), Brown and Reineke (1928), Hay (1930) and Coutard have studied various pathological processes by means of lateral projections of the larynx.

The most important conditions reported upon by these writers are: *1*. Malignancy; *2*. non-malignant tumors; *3*. stenoses; and *4*. tuberculosis.

1. *Carcinoma:* Thost states that carcinoma manifests itself by the production of a tumor mass which projects into the lumen of the larynx, by destruction of laryngeal cartilage and by a granular type of calcification. The validity of the last statement is very doubtful.

Iglauer mentions only the shadow of the tumor mass.

Hay, in addition to the tumor mass, emphasizes the evidence of infiltration, manifested by a sloping up of the surrounding tissue shadows toward the visible margins of the tumor, and a roughened irregular surface.

Coutard speaks of the tumor mass projecting into the lumen of the larynx, of a change in the normal relationship of the shadows of the various structures, especially the increase in the width of the soft tissue shadow between the posterior pharyngeal or laryngeal wall and the spine, and of invasion of cartilage.

The obliteration of the shadow of the ventricles is mentioned by some writers. This sign is worthless because in half of the normal males studied by Hay the laryngeal ventricles could not be seen. We were unable to demonstrate them in one normal female larynx.

I have the impression that destruction of cartilage may be very difficult to detect with certainty, especially in its early stages, because of the great variability and possible asymmetry in calcification.

2. *Nonmalignant tumors* appear as rounded shadows projecting into the lumen of the larynx. Hay emphasizes the absence of infiltration associated with malignancy. Multiple papillomata of the cord give its shadow a nodular appearance.

3. *Stenosis* produces a narrowing and distortion of the lumen of the larynx and the upper part of the trachea.

4. *Tuberculosis,* according to Thost and Iglauer, causes a decalcification of the cartilages, giving a characteristic washed-out, hazy appearance to the shadow, and a thickening of the soft tissue shadows in the involved area.

Consideration of the pitfalls in the differential diagnosis of these diseases and of other less common conditions is impossible for lack of time.

DISCUSSION.

Opinions as to the importance of the Roentgen examination of the larynx vary from that of Brown and Reineke, who found it of little aid in diagnosis, to that of Coutard, of the Curie Institute of Paris, who finds it of great help in the diagnosis of malignancy and in selecting the type of treatment for the individual case. He states that carcinomas so situated that only an experienced laryngologist can recognize them may be detected on the film. Hay, on the other hand,

was unable to demonstrate eight carcinomas less than 1 c.m. in diameter.

If I may express a personal opinion, I have the impression that the Roentgen examination of the larynx will never assume the important position it holds, for example, in the diagnosis of diseases of the gastrointestinal tract and of the lungs. However, as a supplement to the mirror and the laryngoscope of the skilled laryngologist, it offers certain possibilities. It will show, for example, the extent of a stenosis, how far a malignant growth projects downward, the presence of cartilaginous destruction in occasional instances, and the effect of treatment when radiotherapy is used. It will be useful where direct methods of examination are impossible.

I am forcibly impressed with the difficulties inherent in the interpretation of films of the larynx. It must be based upon thorough familiarity with the normal variations. Nevertheless, the additional information to be gained thereby makes the Roentgenology of the larynx worthy of continued study, especially in view of the possibility of improved technique with the new high-powered X-ray machines.

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Presbyterian Hospital.

EVALUATION OF ROENTGENOLOGY IN OTO-LARYNGOLOGY.

V.—ESOPHAGUS.*

Dr. A. Judson Quimby, New York.

Visualization of the esophagus is dependent upon the introduction of an opaque media which has sufficient resistance to X-ray to cast a distinct shadow having contrast that will distinguish it from surrounding structures.

The introduction of the media may be through the normal process of swallowing or by flexible, distensible tubes. The former method is the one of choice in my own work, therefore I will limit my discussion to it.

The best opaque media is a heavy suspension of pure barium sulphate in water. Addition of other materials, such as cereals, mucilaginous substances, etc., decreases the contrast of the resulting image. Barium should be added to the water until its consistency is about that of extra heavy cream.

The best practice is to make a preliminary survey of the esophagus before fluoroscopy is undertaken. A desirable method is to place the patient supine, instruct him as to the object desired and have an assistant to administer the barium suspension. The patient is instructed to drop the head and hold the breath after swallowing about five ounces of suspension and this exposure should be made instantly after the drop of the head.

Subsequent Roentgenograms of the esophagus in the lateral and lateral oblique and vertical positions can be taken as indicated. Fluoroscopy is greatly simplified by a study of the film taken supine. The supine films should be sufficient to obtain all parts from the postpharyngeal space to the fundus of the stomach. Frequently valuable information can be obtained with regard to the drainage of the pyriform sinus which occasionally causes esophageal symptoms.

This preliminary survey will localize diverticula and suggest further study at various angles.

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Pulsion diverticula call for inspection and Roentgenograms from right and left oblique angles, as in many cases it is desirable to know the point of exit.

Traction diverticula may be found in any portion of the esophagus and are most commonly in the middle third.

Where lesions and mechanical obstruction involve the esophagus, complete filling of the section under suspicion is very important and at times a confirmatory Roentgenogram is desirable.

Organic changes are usually determined by modification of normal contour.

Obstruction, whether a stenosis or kinking, is most readily determined by increase in diameter of the esophagus. A true stenosis is more frequently in or near the cardia than other locations. A large per cent at this point are secondary to ulceration, while stenosis in the upper portion is more commonly the trauma from foreign bodies or escharotics.

The pinchcock obstruction or kinking that occurs at the cardia is primarily due to anatomical deviations as described by Mosher, of Boston, but I am convinced, in some of these cases, the pinching is due to rotation and descent of the liver in visceroptosis. Organic changes, stenoses, varicosities, etc., may all exhibit signs on X-ray films.

Displacements of the esophagus by an enlarged left ventricle, aneurisms and other interthoracic pathology is of great supplementary interest in confirmatory diagnosis.

5 East Fifty-Seventh Street.

EVALUATION OF ROENTGENOLOGY IN OTO-LARYNGOLOGY.

VI.—THE TEMPORAL BONE AND ITS VARIATIONS.*

MR. E. B. BURCHELL, New York.

The first illustration is that of an average pneumatized type of temporal bone. It shows the antrum to be of moderate depth. The corresponding picture is that of an infantile type of temporal bone, showing the floor of the middle cranial fossa dipping below the petrosal ridge and almost obliterating the antral space, due to its close contact with the roof of the horizontal semicircular canal.

We regret that the X-ray photographs of the various mastoid types and anomalies described in this paper have not been furnished for publication.

The following is a highly pneumatized type of temporal bone illustrating the promontory and Jacobson's nerve; the bony canal for the musculus tensor tympani; and a styloid process, measuring 2¾ inches in length.

The next picture is that of a double tip. Following that is a large pneumatic type of temporal bone revealing a large cavity, well walled off, in the region of the knee of the sinus. The reason for exhibiting this is that it is apt to be misinterpreted by the Roentgenologist as an abscessed cavity.

The fourth illustration is another highly pneumatized type of temporal bone, this one displaying the Fallopian canal from its knee to the stylo-mastoid foramen. It will be noted that the posterior wall of the canal shows a marked dehiscence, which communicates with the adjacent cells. This, in my opinion, indicates why we have paralysis of the seventh nerve in acute infected cases, before operation, since the communication of the cells offers a passage for the migration of toxic substances.

Next we see a very deep jugular fossa with dehiscences which communicate with the tympanic cavity through its floor, thus affording a pathway for infectious material to enter into the bulb of the sinus.

Succeeding is another very deep jugular fossa with dehiscence of the Fallopian canal in its posterior wall.

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The next specimen demonstrates a jugular fossa surrounded by large pneumatic cells, commonly known as the bulbar cells.

Succeeding is an X-ray picture of a pneumatic bone with extension of the cells high up into the squama. This case came to operation without having been X-rayed; the patient suffered with an interrupted convalescence, and was finally X-rayed to determine whether any cells had been left at the time of operation. It was then revealed that there was a mass of pneumatic cells in the squama, the septa of the cells having a broken down appearance, and being cloudy throughout. At operation this cavity was evacuated, free pus being obtained; an uneventful convalescence ensued.

The next is a pneumatic specimen containing a medium size type of cell with a beautiful demonstration of the course of the seventh nerve.

The tenth specimen is that of a pneumatic pyramid with cells that are extremely large, and extend beneath the groove for the sixth nerve.

The next is a preparation made with Wood's metal, of a highly pneumatic type of bone, displaying the semicircular canals, also the crus commune or the common opening where the posterior canal joins with the superior canal; the internal meatus with the first turn of the cochlea; and large pneumatic cells extending into the extreme apex of the pyramid.

The last specimen demonstrates an extremely far forward and superficial sinus beneath the spine of Henle, making it impossible to reach the antrum via the usual surgical route.

THE ACCESSORY SINUS AND ITS IRREGULARITIES.

The first demonstration is a wet preparation demonstrating the eye and its appendages in the orbit. It will be noted that the ethmoidal cells protrude over the roof far to the temporal side of the median line.

The next is a specimen showing the ethmoidal cells extending for a considerable distance over the roof of the orbit as well as back into the anterior glenoidal process.

The third illustrates prolongations of the ethmoid over the roof of the orbit, as well as an ethmoidal bulla in the frontal sinus.

Following is a relatively large frontal sinus, together with a large cell in the crista galli.

Next is an extremely deep sphenoidal sinus, the floor of which extends as low as the pterygoid process.

Finally there is a medium size sphenoid with the posterior ethmoid protruding back over the roof of the sphenoidal sinus.

New York Eye and Ear Infirmary.

VII.—RELATION OF ROENTGENOGRAPHY OF THE CHEST TO THE LARYNGOLOGIST. ATELECTASIS AND NEOPLASMS OF THE LUNGS.*†

DR. COLEMAN B. RABIN, New York.

Since the laryngologist has extended his domain to the field of pulmonary diseases, he has had increasing need of help from both the clinician and the Roentgenologist. The Roentgenologist, from the beginning, has been able to supply this aid. The widespread use of bronchoscopy, however, has been of inestimable value to him. The bronchoscopist has made it unnecessary to await the findings of the postmortem examination to confirm the Roentgen diagnosis. This is particularly true for intrabronchial lesions. The lessons learned from the correlation of bronchoscopic and radiographic examinations have raised the level of diagnostic certainty to such a degree that the radiologist is now enabled to be of invaluable assistance to the bronchoscopist. By means of the Roentgen examination he can determine with a fair degree of certainty the indications for bronchoscopic diagnosis and therapy.

ATELECTASIS.

The form of atelectasis that is most important from the bronchoscopic point of view, is that resulting from bronchial obstruction. This is the type of atelectasis that is most easily recognized Roentgenologically. The typical Roentgen picture is characterized by a more or less opaque, homogeneous shadow, usually involving at least an entire lobe of the affected lung. As a rule this shadow is sufficiently translucent so that the vascular markings of the lung may be visualized through it. It may best be described as a diffuse, veil-like shadow. Because of the lessened expansion of the lung and the resulting increase in the negative pressure of the pleural cavity the following changes take place: the heart and mediastinal structures are drawn to the affected side, the diaphragm is drawn upward and the ribs are drawn together, causing a flattening of the chest. Ribs which are drawn together are invariably more angulated so that they appear to overlap one another on the Roentgen film. This ostensible overlapping is well described by the term "shingling." A diminution in the size of the affected side by shingling of the ribs, flattening of the chest, and displacement of the diaphragm and the mediastinal structures, together with the veil-like shadow, are pathog-

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†From the Dept. of Radiology, Mt. Sinai Hospital, New York.

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nomonic of atelectasis due to obstruction of the bronchi. There is an additional sign which is visible only with the aid of the fluoroscope, *i. e.*, a movement of the heart to the side of the lesion during inspiration. The pulling of the noninflatable lung by the diaphragm and the chest wall causes this phenomenon.

Massive collapse of the lung is probably the most dramatic form of atelectasis, both because of the sudden onset, and the equally sudden relief after bronchoscopic treatment. Many of the cases follow operations performed under general anesthesia, but a considerable number have been observed without antecedent operation or anesthesia. Cases have been described in the literature in which there was no apparent bronchial obstruction. The Roentgen picture of atelectasis of an entire lung seems to indicate that bronchial obstruction is a necessary forerunner. This is in accord with our pathological experience. It is true, however, that the main bronchus to the lung need not be obstructed. The same picture may be obtained from obstruction to the smaller bronchi by mucoid exudate. In such cases the cause of the atelectasis is easily overlooked, even at autopsy. Bronchoscopy certainly would be of little avail in relieving such obstructions, since the bronchi involved are of too small a calibre to be reached by the instrument.

The main bronchi are obstructed in most instances. The chief cause of massive atelectasis is inflammation of the large bronchi with the formation of a thick mucoid or fibrinous exudate. This occurs as a result of irritating anesthetics, attacks of bronchial asthma, bronchial infections, and occasionally in tuberculosis. The role of foreign bodies in the causation of massive collapse is evident. Naturally the nature of the obstructing material can be recognized radiologically only when it is dense enough to cast a shadow. This will occur only in the case of the radio-opaque foreign bodies. If it is borne in mind that the picture of massive collapse is always due to bronchial obstruction, the indication for bronchoscopy from the standpoint of treatment is obvious.

Atelectasis of part of a lung usually involves an entire lobe, and in cases of atelectasis of the right lower lobe often involves the middle lobe as well. This is due to the fact that the bronchial obstruction is usually situated in the main bronchi of the lobes, and rarely in isolated smaller branches. The Roentgen picture of the lung itself is similar to that seen in massive collapse, *i. e.*, a veil-like shadow through which the vascular marking may be visualized. The shifting of the heart and the elevation of the diaphragm, however, are not nearly so marked, and the shingling of the ribs is localized over the affected lobe. The border of the lobe is sharply demarcated because

the uniform shadow extends to its extreme limits. A knowledge of the normal position of the fissures between the lobes will aid in the interpretation of the degree of atelectasis. In atelectasis of the upper lobes the trachea is drawn over very sharply. The angulation of the trachea is accentuated by the fact that the lower lobe bronchus pursues its normal course.

Neoplasms, foreign bodies, strictures and broncholiths are the most common causes of obstruction to a part of the lung. All of these give rise to the picture of atelectasis which has been described. In addition, they may cause other manifestations consequent to the obstruction of the bronchial tree. Incomplete obstruction of a bronchus may permit the inflow of air into a lobe, but interfere with its outflow. This gives rise to a picture which is the opposite of atelectasis, *i. e.*, emphysema. There is an excess areation of the affected lobe which causes that part to appear darker on a Roentgen film, as if it were overexposed. The increased volume of the lobe displaces the mediastinal structures to the opposite side, the ribs are spread apart and the width of that side of the chest is increased. An area of illumination is seen to overlap the mediastinum for a short distance. This is due to the interposition of an overdistended lappet of lung between the sternum and the mediastinal structures.

This period of bronchial obstruction is usually short because the conditions in the lung rarely remain static for any length of time. The obstruction may be released and the lung return to its normal state. Often the obstruction becomes complete, giving rise to the picture of atelectasis.

In many cases an infection of the partially obstructed lobe ensues, from the stagnation of bronchial secretions. The picture of infection then dominates. The Roentgenogram will show evidence of a pneumonia which frequently is of a chronic type with the production of a considerable amount of scar tissue. A dense shadow will be cast by the infiltrated, fibrotic, and partially atelectatic lung and the chest wall and mediastinum will be drawn together. At times there is also an elevation of the diaphragm. The veil-like shadow is absent, the vascular markings of the lungs being obscured by dense shadows due to exudate and scar tissue.

NEOPLASMS OF THE LUNGS.

There is, perhaps, no field in the realm of bronchoscopy with the exception of the detection and removal of foreign bodies, which is so spectacular as the recognition of pulmonary neoplasms. By means of bronchoscopy one is enabled to diagnose with certainty those neoplasms which the clinician only suspects and which may be undetectable by any other method.

The first lead which is available to the clinician in the diagnosis of this condition is the Roentgen examination. Before the utilization of the X-rays, pulmonary neoplasms were rarely diagnosed during life. In this era of more exact Roentgen interpretation, most of them may be either diagnosed or suspected by this method alone. However, no Roentgenologist can be absolutely certain that his diagnosis is correct from the study of the shadows cast by the Roentgen rays. His diagnosis is made by inference and may lead to error. It would be wrong to condemn every such patient to the ultimate prognosis which must follow upon the diagnosis of a malignant neoplasm of the lung. A more certain method of diagnosis of this condition must be utilized, if we are to be at all fair to the patient before passing judgment on this necessarily fatal disease. The exact determination of the presence of this type of neoplasm can be made only by microscopic examination of excised tissue. The procuring of this tissue is the main function of bronchoscopy in malignant neoplasms of the lungs.

An error in Roentgen diagnosis may be made in considering a neoplasm to be malignant when it is really benign. In many of these latter cases, the bronchoscopist is able not only to diagnose the true condition, but also to establish a cure.

It is the function of the clinician, together with the Roentgenologist, to determine in which case the bronchoscopy is likely to disclose neoplastic disease. The Roentgen picture is often the determining factor in making this decision. It is advisable for the bronchoscopist to acquaint himself with the Roentgen appearance of these neoplasms not only that he may decide for himself which cases to bronchoscope, but also that he may gain an insight into the pathological development of these neoplasms. By means of Roentgenography, we are enabled to observe much more concerning the history of the neoplasms than the pathologist may reconstruct from his postmortem findings. The latter sees only one stage of the disease and that is only the terminal stage in most instances. He considers himself fortunate indeed, if he can observe the earlier stages when the neoplasm is found incidentally in patients dying from other causes. The radiologist sees all the stages in the evolution of the disease even though he sees only shadows. He can interpret these in terms of pathology, especially if he keeps the clinical findings in view.

TYPES OF NEOPLASMS.

From the point of view of the Roentgenologist, the pathologist and the clinician, it is well to divide the neoplasms into those which spring from the larger bronchi, those arising from the smaller branches, and those which take their origin from the parenchyma of the lung.

PARENCHYMAL TYPE.

The last type is the one which is most easily recognized by the radiologist, often gives no signs to the clinician until metastases have developed and because of its position cannot be visualized by the bronchoscopist at all. These are always well localized round tumors which grow slowly, but often reach huge proportions, at times occupying an entire lobe of the lung. Their main importance for the clinician lies in the fact that of all the neoplasms of the lungs these are the ones which on theoretical grounds should offer the greatest prospect of cure by surgical removal. They are hidden to the bronchoscopist because of their position in the lung. He may judge their presence indirectly by the fact that when they are quite large they are apt to displace and distort some of the large bronchi by external pressure.

BRANCH BRONCHUS TYPE.

The neoplasms which arise from the smaller bronchi are also situated so far down the bronchial tree that they cannot be directly visualized through the bronchoscope. They are of two types. The first consists of those which form localized tumors similar to those which arise from the pulmonary parenchyma. These also cast dense shadows on the Roentgen film but they are not so sharply demarcated. These neoplasms usually invade the segment of the lung which is supplied by the bronchus from which it arises. In this manner a portion of the lung which lies at the periphery is infiltrated. In some cases, the neoplasm invades the adjacent ribs and chest wall but it usually remains confined in this region and does not spread to the center of the lung. The shadow cast by it is therefore a localized shadow directed towards the periphery, and the chest wall over it may show tumefaction and at times destruction of a rib. If situated at the base of the lung it may involve the diaphragm. This invasion of the diaphragm is best inferred from a fixation or adhesion of a portion of the diaphrgam best seen on fluoroscopy or on films taken in the oblique and lateral positions.

The second type of neoplasm which originates in the small bronchi consists of those which are of a more infiltrative nature, and although the primary growth itself cannot be reached by the bronchoscope the secondary infiltration of the larger bronchi may be seen. Their growth does not remain localized, but extends along the lymphatics which course in the pulmonary septa and about the bronchi and blood vessels. They often extend along these routes to the mediastinal nodes, the involvement of which may become so great as to result in formation of large mediastinal masses. This process may also involve the pericardium, giving rise to a large pericardial effusion. At times, the heart muscle is infiltrated. In the course of the disease,

the lymphatics throughout the lung may be invaded, the neoplasm may extend to the pleura, which becomes studded with many fine nodules. This last change may be associated with large pleural effusions of cancerous origin.

The Roentgen appearance closely follows the pathological process which has been described. All stages of the progression of the neoplasm along the lymphatic channels may be observed. The early picture of these infiltrative growths of the smaller bronchi is quite similar to that of a revolving or indurative pneumonia involving a small portion of the lung. There is a rather faint mottled shadow of moderate extent which represents the local lymphatic extension of the neoplasm in the septa of the lung and about the bronchi and blood vessels. These shadows may become more dense as the infiltration progresses. Later, with the enlargement of the mediastinal lymph nodes a bulge of the mediastinal shadow may be observed and, at times, these nodes may become so large as to cause a marked widening of the normal shadow cast by the mediastinal structures. In these cases of widespread lymphatic invasion, numerous small, mottled, circular or twig-like shadows may also be seen throughout the lung. At any time, a dense shadow may appear which is due to a pleural effusion which fills the chest from apex to base, and displaces the heart and mediastinal structures to the opposite side, and which may spread the ribs for a discernible distance. Occasionally, the cardiac shadow is seen to enlarge in all directions and the contours of the heart, which are normally easily recognizable, become obliterated. This is due to the development of an effusion in the pericardium because of metastases to this membrane.

MAIN BRONCHUS TYPE.

The neoplasms arising from the larger, or root bronchi, are the most common, comprising 70 per cent of all the primary neoplasms of the lungs. These spring from the main bronchial trunks or their branches to the lobes. Although the degree of infiltration of the pulmonary tissue is variable, all the malignant forms are of an infiltrating nature. For purposes of Roentgen diagnosis, as well as for an understanding of the clinical and bronchoscopic manifestations, they are best divided into two groups, namely, those which cause stenosis of the bronchi and those which infiltrate the bronchial wall without causing any considerable degree of narrowing. Both types are within reach of the bronchoscope and should be easily recognized.

The stenosing type manifests itself radiologically by the obstructive effect upon the lung. The Roentgen picture is similar to that of bronchial obstruction from other causes. Obstructive emphysema

of short duration occurs occasionally. Most commonly the signs of atelectasis of the entire lung, or one of its lobes are present. The veil-like shadow previously described, and a flattening of the chest by shingling of the ribs, and a shifting of the mediastinal shadow to the affected side are the most common signs. They point to an obstructive lesion, which, in middle aged persons, is most often neoplastic in nature. Infection of the atelectatic lung may be characterized by a dense infiltration of the atelectatic area. Less often the picture is that of bronchiectasis or lung abscess.

More definite evidence of the malignant nature of the obstructive lesion is afforded when other Roentgen signs indicative of malignancy are present. Thus, the shadow of a dense infiltration at the hilus of the lung, visible through the veil-like shadow of atelectasis, is always indicative of the local spread of the malignant neoplasm. The occurrence of metastasis to the mediastinal lymph nodes may cause a widening of the mediastinal shadow, or a paralysis of the diaphragm by pressure on the phrenic nerve. The latter is evidenced by a marked elevation of the diaphragm on the affected side, and lack of descent on inspiration, best observed by means of fluoroscopy. In fact, the paralyzed half of the diaphragm often moves upward during inspiration, a paradoxical movement caused by the increased intra-abdominal pressure occurring during inspiration.

Roentgen evidence of metastases in the ribs also confirms the malignant nature of the obstruction. Involvement of the pleura by metastatic neoplasm results in the formation of a large pleural effusion which causes the appearance of a very dense, uniform shadow involving the entire thorax on the affected side. Because of the contraction of the lung resulting from the bronchial obstruction and the fixation of the mediastinum from secondary infection, the mediastinal structures are not forced toward the opposite side. The bizarre picture of a large pleural effusion with the mediastinal structures either in their proper positions or displaced to the side of the lesion is almost always due to a stenosing bronchial neoplasm with metastases to the pleura.

The stenosing type of neoplasm causes symptoms rather early in the disease. Its Roentgen signs are usually quite definite. For these reasons the indication for bronchoscopy is quite clear. Furthermore, the bronchoscopic finding of an obstructive, usually fungating mass, rarely causes any difficulty in the diagnosis. This is far from the case in the nonstenosing type of main or root bronchus neoplasms. In the case of these neoplasms, the classical, almost self-evident signs of bronchial obstruction are absent, and the Roentgen diagnosis must be made from the manner in which the neoplasm spreads.

A not uncommon picture is that of a triangular shadow with the base toward the mediastinum, and the apex extending toward the middle of the pulmonary field. This is caused by a local infiltration of the hilus by the neoplasm, together with the involvement of hilus lymph nodes. At times a linear extension along the interlobar fissure is seen extending from the apex of the shadow. This is due to local involvement of the pleura. It is a pathognomonic manifestation of primary pulmonary neoplasm. A dense shadow at the root, invading the lung by radiating extensions which become less dense toward the periphery, is another common picture. At times the primary neoplasm at the root may be barely visible, and only fine mottlings throughout the lung may be seen.

In certain cases the neoplasm may be hidden by the mediastinal structures, and only the secondary manifestations of its extension are visualized. Large mediastinal lymph nodes, simulating a primary mediastinal tumor, scalloped metastases to the pleura, or erosion of the ribs by metastases constitute the only Roentgen evidence. Pleural effusions large enough to displace the heart and mediastinal structures are usually neoplastic in nature, but it is not always possible to state that the origin is pulmonary from examination of the film alone. In rare cases visible extension of the neoplasm is lacking, and if the primary neoplasm at the root is hidden by the shadows of the mediastinum, the film may be entirely negative.

In all these instances a definite diagnosis can be made only by bronchoscopic examination. The indication for bronchoscopy may be suggested only from the clinical findings in some of the cases. In others, the clinical signs and symptoms are few and misleading, and the Roentgen findings form the indication for bronchoscopic diagnosis. It must be remembered that in the case of the nonstenosing root neoplasms, cough is caused only by the ulceration of the tumor itself. In the absence of ulceration of the bronchial neoplasm, the symptoms are referable to metastatic phenomena, and the only manifestation of the underlying disease may be the abnormalities on the Roentgen film.

Although situated in an accessible region these neoplasms may be missed even on bronchoscopic examination if specimens are not taken for biopsy. The nonulcerative, nonstenosing growths often infiltrate beneath the mucous membrane only. The malignant nature of the infiltration, in these cases, may remain unrecognized not only bronchoscopically, but even at the autopsy. The only way to avoid this error is to procure material for pathological examination in all cases where some abnormality of the mucous membrane is found.

1235 Park Avenue.

LEFT CAVERNOUS SINUS THROMBOSIS. CASE REPORT.*

Dr. Homer Dupuy, Dr. H. F. Brewster and
Dr. Ashton Thomas, New Orleans.

Colored boy, age 15 years, referred to Dr. Dupuy's Service, Charity Hospital, Feb. 12, 1932. Markedly stuperous, extensive furunculosis of upper lip, left orbital cellulitis, edema of lids, left exophthalmos, retinal hemorrhages; temperature, 102°.

History: Swelling of upper lip and face several days, when eye became involved only one day before admission to hospital.

Emergency operation within four hours after admission, Dr. Home Dupuy operating, assisted by Dr. Brewster and Dr. Thomas. *1.* Ligation of internal carotid artery, left side. *2.* External canthotomy, followed by enucleation of left eye, with complete exenteration of contents of orbital cavity. Considerable pus encountered in deeper area of orbital cavity, posterior to Tenon's capsule. *3.* The lamina of bone between optic foramen and sphenoidal fissure removed with chisel and large curette. Cavernous sinus entered with blunt Mayo scissors. Little if any hemorrhage noted, due to blockage of sinus by a thrombus. Gauze drain inserted in sinus cavity. *4.* Patient had a stormy postoperative four weeks. Four separate blood cultures gave positive staphylococcus aureus growth. *Treatment:* Several administrations of antistreptococcal and erysipelas antitoxins. Gentian violet and mercurochrome given intravenously. Three blood transfusions, with the usual general measures; on the third week, blood cultures negative, and temperature dropped from an average of 102.3° to normal. We present the patient in perfect health, our staff is greatly encouraged and inspired by such a victory over an affection with a practically zero prognosis.

Dr. Homer Dupuy: Dr. Thomas in his presentation has stressed the main points. As the operator I may be allowed to elaborate. I can best do this by answering questions which must be in the minds of our audience. *1.* Why ligate the internal carotid? Wells P. Eagleton first expressed the idea that the pulsation of the internal carotid which courses within the cavernous sinus structure is a factor

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in the extension of the infection intracranially. The pounding of the artery contiguous to a thrombosed vein must cause an extension of the infection not only within the affected sinus, but through the circular veins, intercommunicating from sinus to sinus, to the opposite hitherto normal cavernous. We regard this anatomical relationship as of greatest importance. Once the hitherto normal eye becomes exophthalmic, our surgery is too late, the inevitable fatal issue occurs. Noteworthy is the fact no hemiplegia followed the ligation.

2. Why remove the eye? Invasion of the cavernous from the front, "boils" in the facial region means, in our experience, pus in the apex of the orbit. I have never seen multiple punctures of the orbit, but add to the already existing infective process. In primary orbital abscess, and such a condition in the light of modern clinical and operative findings seems extremely rare. Ethmoid and frontal suppurations with their invasions of the orbit explain many, if not all, of these primary (?) orbital abscesses. One thing certain, in genuine cavernous sinus thrombosis, multiple punctures of the orbit destroy all chances of success. I am familiar with the Kroenlein operation from the temporal region; it seems too conservative in the presence of such a formidable menace as we are considering. It requires great courage to advise enucleation when no blindness is yet present. But it also requires enlarged experience, and a few post-mortems obtained in our service, to convince us that there is always more pathology in the apex of the orbit than we suspect. To reach this as quickly as possible, before the intracranial invasion, is our chief objective. The exophthalmos is an infallible guide that radical measures must be instituted. Dr. Dimitry asked about the possible value of ligating the angular vein. If the eye condition cleared up, we seriously doubt that there was genuine cavernous sinus thrombosis. With no initial lesions on the face, there may have been a simple venous obstructive type of trouble. It seems possible to control this type by a timely ligation. No such type has presented itself in my experience. But, if after ligation of the angular vein the other eye becomes involved we are too late for more radical promiseful surgery. That is the rub. With the Eagleton idea and with the Mosher approach to the sinus itself through the sphenoidal fissure, we certainly have made some advance in the mastery of a hitherto fatal affection. It may not be the last word, but we are on our way. One great lesson must be impressed on us: in furuncles of the facial area, do not do meddlesome surgery; do not piddle with this form of infection. Conservatism and watchful waiting should be our axiom.

I have modified the Mosher idea. I ligate the internal carotid instead of the common carotid and I also have an idea that if we catch our patient very early, enucleation with complete exenteration of the orbit without exposure of the sinus might effect a cure. But I would always ligate the carotid.

933 Canal Bank Building.

DISCHARGING EAR, EIGHTEEN YEARS, RELIEVED BY NINE TREATMENTS OF MERCURY-QUARTZ LIGHT. CASE REPORT.*

Dr. Philip S. Stout, Philadelphia.

Miss B., age 25 years, private patient, referred to writer twelve years ago by Dr. Hart Baxter. Had pneumonia at age of 7 years. Shortly after that the left ear began to discharge and continued to discharge. Six years ago, age 19 years, the writer did a mastoid operation on the same ear, not for the discharge but because she had some alarming symptoms of intracranial conditions and profound giddiness and vertigo. These conditions cleared up after the operation but the discharge continued. She has had treatments by the writer and others before and since the operation. She has been four years away at college. Finally everyone felt that something more must be done to stop this everlasting foul-smelling discharge. Radium or mercury-quartz light were suggested. She selected the latter, with the most excellent results. The whole cavity is dry, free from odor and with fairly good hearing. She had nine treatments, one to one-and-one-half minutes each. Quartz pencil into the cavity of the ear. Presentation of patient.

269 South 19th Street.

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AN INEXPENSIVE PHOTO-MICROGRAPHIC APPARATUS.

Dr. R. Lorente de No, St. Louis.

In neuro-anatomical or otological work micro-photographs with low magnification of large objects are needed very often. Since the low power microscope objectives are not suitable for photography, the combination of objective and ocular always gives a higher magnification and smaller field of view than desired. This excludes the use of small cameras. On the other hand, the large cameras that allow the use of the planar objectives are too expensive. In this Institute, however, a camera has been built that, although inexpensive, renders the same service as the most costly-built apparatus.

The microscope is an old student microscope (Model 1890 of Leitz or Zeiss), somewhat modified in our mechanical department. The narrow tube has been replaced with a piece of wider brass tube cut at the desired length; the front of the new tube is closed with a plate carrying in its center the terminal of the old one with the screw for the objectives; the posterior end is connected with the camera in the customary way. The mechanisms for coarse and slow motion have not been modified; but as the axis of the wide tube did not coincide with the axis of the condenser, the stage of the microscope has been mounted on a saddle stand on the optical bench that carries the illuminating system. The condenser sleeve has been provided with centering screws and a ring that receives the standard spectacle or aplanatic condensers of Zeiss. The foot of the microscope has been provided with three screws for adjustment in high, and the microscope mounted on a board of hard wood covered with brass plate. It has been found advisable to use the illuminating system of C. Zeiss. The lamp is the projection lamp Mazda, 6 V., 12 A.; and four lenses [lamp condenser 4.7 (5) c.m. (If) with auxiliary condenser H100, centering lens Z 70 (or 40) and condenser K20] mounted on the standard optical bench concentrate the light on the condenser of the microscope; a small frame placed between condenser K20 and the condenser of the microscope carries the light filters. The projection lamp, although very cheap, is not exactly what ought to be used, because lamp condenser If is built for ribbon lamps, but placing condenser If a little out of focus, the illumination of the field becomes perfectly uniform.

The dark room itself plays the role of the expensive camera. Two holes and a window have been made in the door of the dark room. A hole carries the tube that connects, light-proof, with the micro-

scope; the other carries a steel rod that allows operation of the slow motion of the microscope from the inside of the room. Through the window the operator arranges the slide on the stage of the microscope. In the dark room a small table supports the stand for the photographic plates.

The procedure is now as follows:

The operator standing by the microscope searches for the desired spot in the slide; for this he observes through the window the image projected on an undeveloped plate. He enters the room, closes the door and establishes the connection between the microscope and the upper hole in the door; then he closes the window and with the steel rod that passes through the lower hole focuses the image on the plate, closes the upper hole with a cardboard and substitutes a new

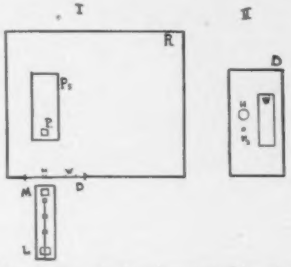

Fig 1. Arrangement of the photomicrographic plant. I: R—dark room with (P.s.) stand for the plate P.; D—door of the room with (W) window and (H) hole for the connecting tube; M—microscope; L—lamps. II. D—door of the dark room with W—window; H—hole for the connecting tube, and H1—hole for the focusing rod.

plate for the used one. The exposure is made simply by lifting the cardboard for the necessary time. The exposed plate is developed and while it is being fixed in a lightproof box, the next slide is arranged on the microscope. The whole procedure is more simple and quicker than with an ordinary camera, so that the apparatus not only is inexpensive, but also saves time and work.

When this "camera" was being built, it was feared that the light rays, after falling on the plate, could be reflected on the wall or on the operator himself, thus producing a diffuse illumination of the plate, but it has been found that nothing of that sort happens; if a shadow is projected in the plate by means of any object placed in the light beam arising from the microscope, that spot of the plate remains unimpressed. Therefore, it is not necessary to make any arrangement of oblique screens in the dark room. The arrangement of the whole photomicrographic plant may be seen in Fig. 1.

Central Institute for the Deaf.

OTITIC HYDROCEPHALUS (PSEUDOMENINGITIS); REPORT OF A CASE.

DR. J. COLEMAN SCAL, New York.

Otitic hydrocephalus may be defined as an acute condition arising as a complication during an attack of simple otitis media. It is characterized by a clinical picture of intracranial hypertension associated with clear cerebrospinal fluid. It usually subsides without surgical intervention.

Quincke was the first to recognize this condition, but Passot was the first who called attention to it in his thesis on "Meningitis et Etats Meninges Aseptiques D'Origine Otique." It took Symonds, however, to bring this condition fully before the profession after he had observed several such cases.

The etiology is still obscure. It is thought to be due to an excessive amount of secretion from the choroid plexus or to a disturbance in absorption of the cerebrospinal fluid through the arachnoid villi. This condition has been observed only in children and adolescents.

The symptoms are those of increased intracranial pressure, increasing headache, drowsiness, photophobia, nausea, vomiting and intermittent fever with varying pulse rates. Rigidity of the neck, papilloedema, Kernig's and other signs may be observed. If pressure symptoms be not relieved, papilloedema is followed by secondary optic atrophy with resulting blindness. Paralysis of the sixth nerve is usually observed, but may appear only as a palsy.

Diagnosis: The diagnosis of this condition is not difficult if the sequence of symptoms be kept in mind. If in the course of a simple otitis media a child should develop symptoms of a meningeal nature and the serological examination discloses normal cerebrospinal fluid which is obtained under considerable pressure, otitic hydrocephalus should be thought of immediately. With the relief of intracranial pressure by repeated spinal taps the symptoms will disappear and an uneventful recovery take place.

Pathology: Passot at autopsies found a congestion of the choroid plexus as well as an edema of the ependyma and subependyma tissues. The dura, although often found under pressure, appears normal. An excess of cerebrospinal fluid is always found in the subarachnoid space, as well as in the ventricle.

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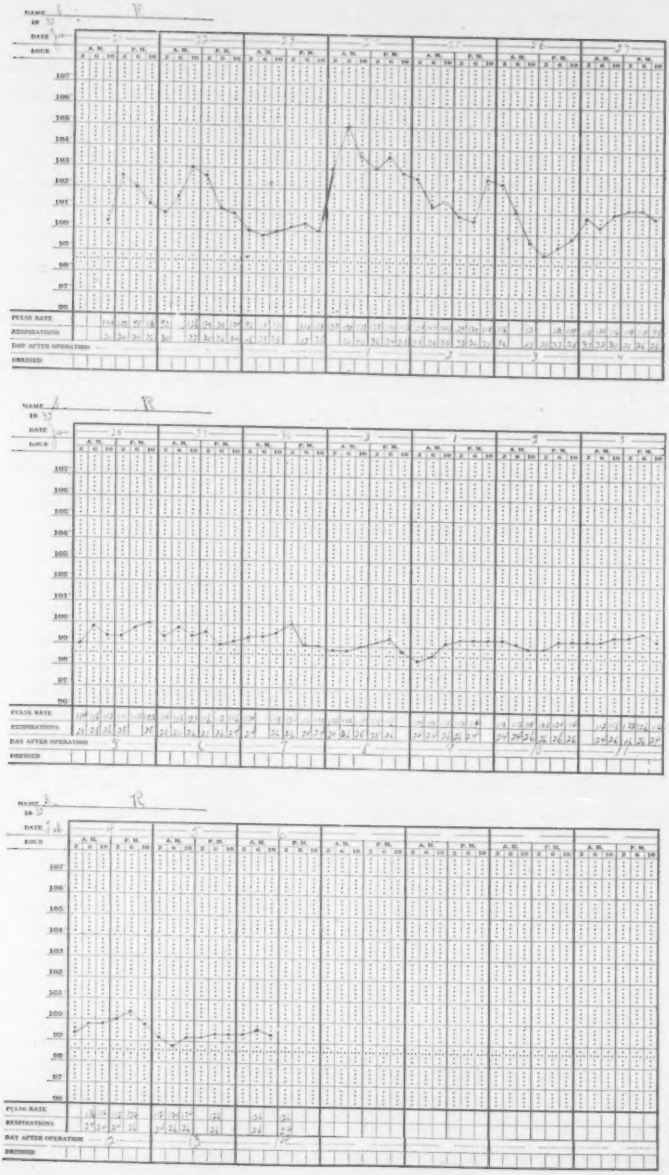
This condition may be mistaken for cerebral abscess, but it can be differentiated from the former by the fact that in cerebral abscess the spinal fluid, although almost always clear, shows an increased amount of protein as well as cells, while in otitic hydrocephalus there is an increased amount of spinal fluid only, with normal cells and protein content.

Treatment: Treatment consists of reducing the intracranial pressure by drainage of the excessive cerebrospinal fluid. Often a single spinal tap may suffice, but repeated spinal puncture should be undertaken until all symptoms of a meningeal nature have disappeared, especially those of recurrent headache and persistent papilloedema. If this procedure fails drainage by ventricular puncture should be undertaken. This can be accomplished either by a decompression operation in the subtemporal region or through the mastoid wound, if a mastoidectomy has been performed. If this procedure fails the other ventricle should be drained.

Discussion: This condition is not new. It must have been observed by many and has been described before as a serous meningitis. It occurs only during an acute attack of otitis media and is often mistaken for a quiet extension of the infective process from the middle ear to the meninges. As only the middle ear is involved there is no necessity for a mastoidectomy or intracranial exploration. The cerebrospinal fluid is always clear and normal, both in cell and protein content, but is always in excessive amount and under pressure. The name of otitic hydrocephalus assigned to this condition is so misleading, however, that I believe a better nomenclature would be pseudomeningitis.

Case Report: R. S., male, age 4 years, normal delivery at birth. Mumps with an axillary abscess that required drainage at the age of three. No other diseases or ailments except attacks of sore throat for the past year.

The present history dates back to twelve days prior to admission to the Beth Israel Hospital when the patient had an attack of acute tonsillitis with fever of 104°, sore throat and slight cough, headache and pain in the eyes. The glands in the left subauricular region became red and swollen. Six days after the onset of symptoms the child began to complain of pain in both ears and on the following day a pediatrician found both ears perforated and discharging pus. During this time the patient had been complaining of increasing headache and pain in the eyes. There was marked photophobia, nausea and vomiting.


NAME
AGE
DATE
HOUR
A. M.
P. M.
PULSE RATE
RESPIRATIONS
DAY AFTER OPERATION
DRESSED

At the time of admission to the hospital on Jan. 21, '1932, examination showed a fairly well nourished boy of four. He appeared acutely ill. His complexion was sallow, but the child was bright and alert. His eyes were kept covered by a kerchief and he kept crying constantly to turn off the light.

There was a slight stiffness of the neck, with an enlargement and inflammation of the glands in the superior part of the sternocleidomastoid muscle. A facial palsy was noted at left side of the face. The eyes showed the pupils reacting equally to light and accommodation, but with a marked photophobia present. Examination of the

NAME R S

URINE

DATE	VOLUME CC.-OZ. IN HRS.	SP. GR.	REACTION	COLOR	ALBUMIN GMS. %	SUGAR GMS. %	ACETONE	DIACETIC ACID	BILE	INDICAN GMS. %	UREA GMS. %	CASTS NO. AND TYPE	R. B. C.	W. B. C.	EPITHELIUM	CRYSTALS
1-21-32		M.B.	alk.	l. Amb	Tr.	0	0					Many Phosphates				
1-26-32		1021	alk.	l. Amb	ft.	0	0					"	"			

BLOOD

DATE	ERYTHROCYTES NO. IN CU. MM.	HB. %	INDEX	LEUCOCYTES NO. IN CU. MM.	TOTAL % POLY.	LYMPHO.	POLYMORPHONUCLEAR NEU.	EOS.	BAS.	OSS.	MONONU CLEAR L.	S.	MON.	PLATE LETS	ABNORMAL FORMS
1-21-32	3,960,000	66		22,600	82	16	6	77				12	6		
1-22-32	3,800,000	64		20,400	87	13	6	80	1			6	5		
1-23-32	3,800,000	62		19,000	73	27	6	66				19	8	1	Myelocyte
1-24-32	3,720,000	62		22,600	87	13	7	80				8	6		
1-25-32	3,680,000	59		16,600	79	21	6	73				15	6		
1-28-32	3,890,000	65		13,400	71	29	7	63	1			19	10	1	Plasma cell
1-29-32	3,890,000	65		16,600	84	16	6	78				12	6	1	" "
1-30-32	2,930,000	62		15,000	75	25	7	68				20	5	1	" "

Mother-Type IV X-matches

BLOOD GROUPING Type IV Mose SEROLOGY

R. S. CEREBRO SPINAL FLUID

DATE	SMEAR	APPEARANCE	PRESSURE	ALBUMIN	GLOBULIN	CU REACT	CELLS C. MM.	POLY %	MONO %	COLLOIDAL GOLD	CYTOLOGY	WASSERMANN	BACTERIOLOGY
1/23/32		bl. slightly blood y	increased	Extra	Extra	Extra	4000	Predominance	typing with typical			neg neg	Culture
1/24/32		bloody	increased	slight	slight	Extra	2200		white cells are	Lymphocytes to			
1/25/32	Citrates	clear	ft. tr.	ft. tr.	ft. tr.	moderate	3600		"	"	red blood cells guinea pig inoculated for T B		
1/26/32	Sugar	clear	increased	Heavy	Heavy	Heavy	100	76	24			neg	neg
1/27/32	10 min	cloudy	increased	Heavy	Heavy	Heavy	mix.	mostly	crystals present			neg	neg
1/28/32			increased										neg

BACTERIOLOGY

DATE	SMEAR	CULTURE	TAKEN FROM	DATE REPORTED	REPORT
1/23/32	✓		Lt. Mastoid	1/24/32	Streptococcus

ears showed a bilateral otitis media with considerable purulent discharge, more so in the left ear, but without any mastoid signs except for a slight tenderness over the tips of both mastoid areas. The impression at admission was acute bilateral otitis media purulenta with a possible cerebral complication.

The throat showed moderately enlarged and diseased tonsils. The pharynx was red and the tongue was heavily coated. The nose showed a watery secretion with excoriations at the nasal orifices, but no purulent discharge. The lungs were clear. Heart apex impulse in the fifth space, 6 c.m. to left of midline, rate rapid (110), rhythm

normal. Sounds good, no murmurs. Blood pressure, 84/60. Abdomen negative, no rigidity. Extremities negative. Neurological examination showed reflexes normal, no Babinski or ankle-clonus present.

A spinal puncture was done immediately and a clear fluid under slightly increased pressure was obtained. The laboratory report indicated a completely negative fluid. Examination of the blood on day of admission showed R. B. C., 3,950,000; Hb., 65 per cent; leukocytes, 22,600; polys., 82; monos., 187; staph. count, 5. An examination of the urine showed an alkaline reaction, with a trace of albumin, no sugar, otherwise negative, except for an abundance of phosphates. The child appeared brighter, with headache less and bearable, photophobia was decreased. The facial palsy was still present. X-ray examination of the mastoids revealed no pathology, but a slight clouding of the sphenoids was observed in the basal plate.

Dr. S. J. Kopetzky was called into consultation and noted the presence of a bilateral otitis media, slight left facial palsy, mild degree of photophobia, otherwise neurologically negative. The possibility of a pneumococcus meningitis secondary to sphenoidal involvement was to be considered. Dr. Kopetzky advised spinal taps, as well as irrigation and adrenalization of the nose.

On the second day, about 6:20 p. m., the child suddenly became quite ill, appearing very pale, with shallow respiration and imperceptible pulse. He rallied in about 10 minutes. Examination at this time disclosed a slightly stiff neck, facial palsy, marked photophobia, a bilateral moderate Kernig and marked ankle-clonus, together with nonexhaustible abdominal and cremaster reflexes present. Both optic discs were found to be blurred and showed some papilloedema. A spinal tap was done immediately and the fluid, which was obtained under slight pressure, was tinged with blood at first, due to the traumatism at the puncture, but quickly became clear. Two hours later the child's symptoms subsided so that he became comfortable again, the neck rigidity and Kernig disappeared, but the photophobia and ankle-clonus still persisted.

On Jan. 23, 1932, the third day after admission, Dr. Kopetzky advised a bilateral simple mastoidectomy, as well as an investigation of the ethmoids and sphenoidal sinuses to eliminate focal infection. An examination of the eyes at this time disclosed a blurring of both discs, especially marked toward nasal sides. The vessels were found tortuous and the veins engorged. No papilloedema present. On the fourth day after admission the child again became very ill and restless. Temperature, 104.6°; pulse, 150, fair quality; complained of headache and marked photophobia, pupils were equal and reacted to

light and accommodation. The neck was stiff and somewhat contracted, both Kernigs were marked, abdominals were gone, exhaustible bilateral ankle-clonus, no Babinski, child very bright and alert. A spinal tap was done and 20 c.c. of clear fluid under moderate increased pressure obtained. The symptoms partially subsided and another spinal tap was done the same day. Examination of the spinal fluid showed normal cells and protein count. No germ was found.

At this time a bilateral mastoid was decided upon and at operation no pathology was found in the left mastoid except that of an acute otitis media. The antrum was filled with granulations. The right mastoid showed no pathological lesion except for the escape of pus in opening one huge cell under the cortex. The sinus plates in both mastoid cavities were exposed and found normal. A small part of the right dural plate was removed and the dura exposed and inspected. It was found intact, normal and not bulging or under pressure. The dura was not punctured or explored. The ethmoids and sphenoids were opened on both sides and found to be negative.

The next day a transfusion of 100 c.c. whole blood, Type 2, was given. The same day intracranial symptoms appeared again and a spinal tap obtained only a slow flow of spinal fluid, of about 20 drops, and then stopped. A cisternal tap was done and 15 c.c. of a clear fluid under normal pressure was obtained. Relief of headache, photophobia and restlessness followed. The cerebrospinal fluid was still found normal and no germ could be isolated. A guinea pig was inoculated with the fluid at this time.

The fifth day after admission the intracranial symptoms again appeared, subsiding after a spinal tap. The facial palsy still persisted.

On the sixth day the child felt better and the symptoms did not reappear. A consultation with Dr. Herman Schwartz was held. Upon examination he came to the conclusion that no definite meningitis existed. His advice was to continue the spinal tap treatment, as well as watchful waiting, and predicted complete recovery.

From this time on the child continued improving, the facial palsy, headache and photophobia disappeared. The mastoid wounds were doing nicely, draining freely, while the nose remained open and clear. The ear canals became dry on the tenth day and the child made an uneventful recovery, leaving the hospital on Feb. 6, 1932, 17 days after admission.

Summary: This case started as an influenzal attack until the sixth day after onset, when both ears were involved the symptoms of intracranial pressure ensued and persisted until the pressure was

reduced by a spinal tap. As soon as the meningeal symptoms reappeared the spinal tap again relieved the symptoms. During this time the urine was examined and found negative. The blood count showed the presence of an acute infection, while the cerebrospinal fluid, upon repeated examination, showed a normal cell and protein content. No germ could be found in the cerebrospinal fluid. X-rays of the mastoids were those of an acute otitis media. This case was that of an otitic hydrocephalus, with symptoms of intracranial pressure, which cleared up completely, with decompression by spinal taps.

44 W. 74th Street.

"The Effect of Naso-Pharyngeal Operations on Renal Functions" is the subject of a report by I. H. Page and A. Alving appearing in the *Journal of Clinical Investigation* for September, 1932.

Whether patients suffering from Bright's disease are able, without detriment to their kidneys, to undergo such operations as tonsillectomy, adenoidectomy and tooth extraction, and whether such operations are likely to affect the subsequent course of the renal disease are the questions which the authors attempt to answer. The clinical material comprises thirty-one cases from the Hospital of the Rockefeller Institute for Medical Research, New York.

The authors believe that the results lead to the conclusions that removal of tonsils, adenoids or teeth usually has no effect, favorable or unfavorable, on the progress of renal disease, but that when the general hygiene of a renal patient demands such an operation it is not necessary to refuse it, unless the renal disease is in the terminal stage or the general condition of the patient is unfavorable.

H. C. R.

INFERIOR MEATAL PUNCTURE VERSUS CATHETERIZATION OF THE NATURAL ORIFICE OF THE MAXILLARY SINUS.*

DR. HENRY DINTENFASS, Philadelphia.

Diseases of the maxillary antrum play such an important role, not only in the practice of rhinology but in medicine in general, that any method that will facilitate the study and investigation of this sinus is to be welcomed. Since the maxillary sinus was first mentioned by Casserius in 1612 and fully described by Nathaniel Highmore in 1651, methods for its investigation have been the subject of much thought.

The antrum may be entered in any one of five ways: first, through the alveolar margin after a tooth has been extracted; second, by means of a puncture through the anterior wall in the canine fossa; third, puncture through the middle meatal wall; fourth, puncture of the inferior meatal wall; and fifth, through its ostium.

The alveolar margin route is only applicable when a carious tooth, usually a first molar, is causing the trouble within the sinus cavity. The tooth is withdrawn and the cavity irrigated. The canine fossa route was employed years ago but later became obsolete. Recently Baum and Maltz have utilized puncturing the canine fossa for the introduction of an antroscope. Its objection as a routine procedure is obvious since considerable traumatism occurs in its performance. Puncture of the middle meatal wall was apparently accomplished with success by Hartmann in 1885. In recent years it has been reintroduced by Yankauer with a specially devised trocar for the purpose. Although this procedure is performed at times with apparent ease and safety, the great objection to its employment is the danger of entering the orbit, especially where there is an anomalous marked outward bulging of the middle meatus and a partial fusion of the pars membranacea with the orbital wall of the antrum. The possibility of hemorrhage from an anomalous vessel should also be considered.

It is apparent, therefore, that the three methods just described cannot be employed as routine procedure in every case. The two remaining methods are inferior meatal puncture and catheterization of the natural ostium.

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*Read before the Philadelphia Laryngological Society, Dec. 1, 1931.

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Puncture of the inferior meatus is done in the following manner. The anterior end of the inferior turbinate, and especially that portion of the lateral nasal wall beneath, is painted with a 10 per cent cocain and adrenalin solution. A straight needle of the Lichtwitz type is introduced beneath the inferior turbinate until it is about half-way back, then the point is elevated by depressing the hand until it reaches the attachment of the turbinate with the lateral wall of the nose, the bone being thinnest here. The needle point is pushed in a direction toward the posterior part of the eyeball of the same side.

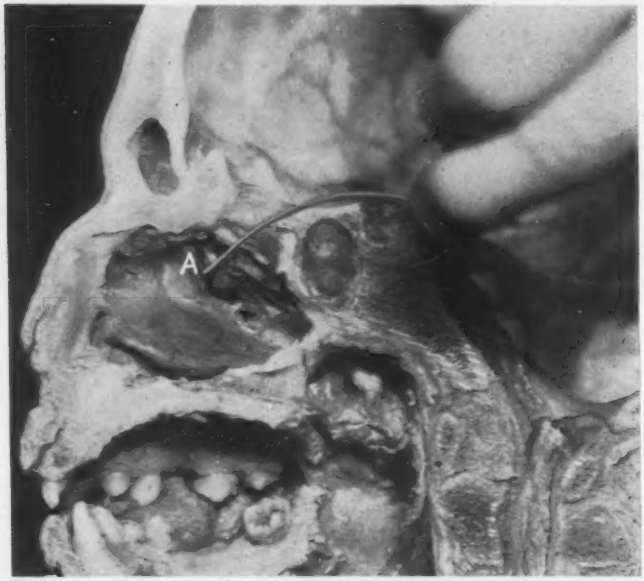

Fig. 1. (A) Point of probe at entrance of the hiatus semilunaris (middle turbinate removed).

A sudden penetration with a crackling of bone indicates that the procedure has been successfully accomplished.

In catheterization or sounding of the natural ostium of the maxillary sinus the following steps are taken: A preliminary application of a 10 per cent cocain and adrenalin solution is made to the preturbinal area, following which a thin tampon of this solution is inserted under the anterior end of the middle turbinate and carried posteriorly until it is admitted into the region of the infundibulum. After a few minutes the tampon is removed and a fine cotton-tipped

applicator saturated with the same anesthetic is placed into the infundibulum. The applicator is bent so that it can be insinuated behind the uncinate. When this area is rendered insensitive the cannula can be introduced. The distal end of the cannula is brought under the anterior end of the middle turbinate and is hooked over the uncinate. The cannula is slowly moved backward toward the posterior end of the infundibulum. It is first directed so that the distal end is pointing downward. If it does not fall into an ostium it is then directed laterally. One knows that the instrument is in the ostium by the depth of penetration of the instrument and by the excursion of the distal end of the instrument. This is after the procedure of Myerson.

There has been much controversy as to which of these methods is the most suitable and practical for the exploration and study of the antrum. It is generally agreed that the inferior meatal puncture is the most frequently employed. Myerson, however, in a recent presentation before the Section of Laryngology, Otology and Rhinology of the American Medical Association stated that catheterization of the natural orifice of this sinus can be performed in 80 per cent of cases and should be the method of choice. Lee Hurd has had practically the same experience sounding the antrum through the natural opening in about 70 per cent of his patients. Schaeffer and others dispute this, stating that sounding can only be done in a small percentage of antra and that the apparent success reported in many instances was due to the instrument piercing the pars membranacea or entrance through an accessory ostium. Mackenty is also in accord with this latter opinion. He insists that it is impossible to wash the antrum unless the ostium happens to be very large, which is not usual when pathological changes have taken place in the antrum. The late Dr. R. H. Skillern maintained that lavage through the natural ostium was a procedure which could be but rarely accomplished, often necessitating the removal of the anterior half of the middle turbinate before it could be attempted. He believed inferior meatal puncture to be the ideal method.

The purpose of this symposium, as indicated by the title, is to consider the respective merits of these two methods, the inferior meatal puncture and ostial catheterization. Advantages and disadvantages of each will be set forth enabling us to determine the more feasible method in antral exploration.

In stressing the arguments in favor of the inferior meatal puncture the following should be noted:

Simplicity of performance.

A straight needle of the Lichtwitz type thrust between the attachment of the inferior turbinate and the lateral nasal wall in the inferior meatus in a direction toward the posterior part of the eyeball of the same side, as already mentioned, will usually enter the antrum without difficulty. Very little previous experience and no special knowledge of anatomy is required.

Successful attainment practically in all cases. Unless the inferior turbinate hugs the lateral wall closely, and even then it can be

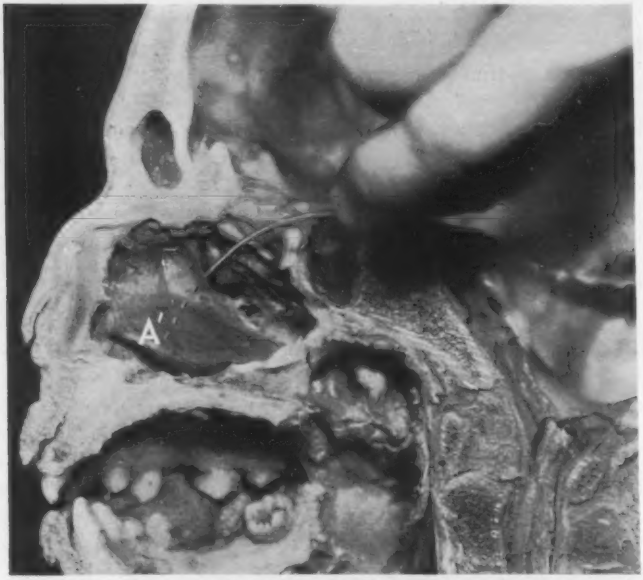

Fig. 2. (A') Point of probe in the maxillary sinus having penetrated the depth of the infundibulum and gone through the natural opening of the antrum. Dotted line indicates depth of penetration. Note the downward, forward and lateral direction of the probe for access to sinus cavity. The difficulty of sounding the sinus through the anterior nasal orifice is quite apparent (middle turbinate removed).

refracted or pushed over, the needle will find its way into the antral cavity in almost every instance. Among thousands of probe punctures, Hajek remembers only two cases in which after repeated attempts he was unable to penetrate the lateral nasal wall.

What are the drawbacks to this procedure?

The Danger of Air Embolism: While this complication is rare and in the opinion of many observers does not exist, not a few cases have been reported following needle puncture which resulted fatally.

Hemorrhage: Inferior meatal puncture has occasioned bleeding in several instances severe enough to necessitate ligation of the external carotid. This is, as a rule, due to an anomalous vessel, usually a branch of the internal maxillary.

Shock: Where the antral wall is very thick it is sometimes necessary to use a mallet to force the needle through the bone into the sinus. The effect on a nervous individual may be quite severe and fainting result.

Pain: In the majority of cases there is an absence of pain, yet occasionally a patient will experience great discomfort in the cheek, eye and even frontal region.

Emphysema and Infiltration of the Soft Parts: This may take place where the antrum is narrow and both walls of the cavity are pierced by the needle. It is manifested by immediate swelling in the cheek, crackling and bogginess being elicited when the tissues are palpated.

Obstruction of the Needle: This is fairly common and is the result of bony particles or even mucous membrane lodging in the lumen of the instrument.

In considering the advantages of ostial catheterization over the meatal puncture it is readily seen that the above dangers—air embolism, hemorrhage, shock, pain and emphysema — are completely eliminated. Sliding the cannula through an opening instead of the necessity of piercing tissue, bony or otherwise, does away with these difficulties and objections. It is often surprisingly easy to accomplish and is appreciated by the patients in whom the antrum has previously been punctured. To this may be added the fact, stressed by Yankauer and Goldman, that in children the natural opening is relatively larger than in adults and that the ethmoidal bulla is small and the uncinate process narrow, with a resultant shallow and wide-mouthed infundibulum, which makes this method particularly applicable in the young.

However, the practicability of using the natural ostia for irrigation also presents certain definite limitations. For example, a markedly deflected septum will preclude the possibility of entering the ostium.

Where the position of the middle turbinate is low the hiatus, bulla and uncinate may be obscured and the hiatus made inaccessible, especially if there is pathologic mucosa in this region.

If the uncinate process is high, that is, over 5 m.m., the ostium is hidden and it is impossible to pass a cannula or bent probe from the anterior nasal orifice.

When the infundibulum is unusually deep and narrow failure may result.

If the bulla covers the whole of the hiatus the introduction of a sound in the infundibulum and particularly in the maxillary antrum may be quite impossible.

Because of the close relationship of the orbit to the middle meatus the improper introduction of the instrument may result in forcing it into the orbital cavity. This is apt to occur if the cannula is placed anterior to the ostium.

Fig. 3. Curved probe necessary for introduction into the sinus through the natural ostium from the anterior nasal orifice. (B) Point of probe at entrance of the hiatus semilunaris (middle turbinate removed).

Another difficulty may arise if the cannula fits the ostium too closely as there may be insufficeint room around the instrument and the return flow obstructed. On the other hand, if the ostium is too large, a very infrequent happening, there is a tendency for the cannula to slip out of the opening during irrigation, necessitating the help of an assistant to hold it in place. Trouble may often ensue if catheterization is repeated too often, the sinus becoming closed, due to irritation of the ostium. According to Mackenty this is not unusual. It should be emphasized here that a great many times the

ostium is not really an opening, like a doorway, but rather takes the shape of a canal, passage, or a tube pointing laterally, downward and in a forward direction (see Figs. 1 and 2, 3 and 4). Hajek advises the preliminary introduction of a flexible silver probe to ascertain the shape of the anatomical parts concerned so that the cannula which is to be inserted can be molded accordingly, thereby insuring a more complete and thorough catheterization of this passage. Hartmann's cannula is fashioned on this principle. In the apparently successful irrigations of the maxillary sinus through this

Fig. 4. (B') Curved probe for introduction into the sinus through the natural ostium from the anterior nasal orifice. Dotted line indicates the depth of penetration (middle turbinate removed).

passage with the nonbendable instruments it must be assumed then that often only the mouth of this canal is reached, actual entrance into the antrum depending upon the pressure of the fluid injected. Cannulae like the Pierce, Siebenmann, Goldman, Bower and the Myerson modification of the Pierce instrument are fairly firm and will not permit of much bending. Dr. Robert Hunter informs me that he uses the Siebenmann instrument with good results.

The presence of accessory ostia, particularly in individuals of adult age, is well known. Sometimes two or more accessory ostia

are present, being located posteriorly and inferiorly to the natural opening. They often afford a more direct communication between the maxillary sinus and the middle nasal meatus, and are more advantageously placed as drainage and exploration points than the regular maxillary ostium, but their use, because of comparative rarity of occurrence, would naturally be limited for this purpose.

SUMMARY.

Inferior meatal puncture can be performed in almost every case and requires very little previous experience. There is, however, greater discomfort and danger of air embolism, hemorrhage, shock, pain and emphysema of the soft parts following its employment. Ostial catheterization obviates these drawbacks but it cannot be used as frequently as the inferior meatal puncture because the anatomical configuration will not permit. It also demands a thorough knowledge of the anatomy of the lateral nasal wall, together with some degree of skill and experience. Nevertheless, when it can be accomplished it is performed with such apparent ease as to evoke favorable comment on the part of the patient.

In the diagnosis of disease of the maxillary antrum, therefore, ostial catheterization should always be attempted before resorting to the puncture of the inferior meatus.

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1305 Spruce Street.

AN EFFECTIVE SUBSTITUTE FOR COCAIN AND PROCAIN IN RHINOLARYNGOLOGY.

DR. WILLIAM LAWRENCE GATEWOOD, New York.

As valuable and effective as cocain hydrochlorid is for surface anesthesia in rhinolaryngology, one is constantly confronted by the possibility of intoxication when this drug is used in adequate concentration. In an experience now covering a number of years, so much have I been impressed by the dangerous possibilities attendant on the use of cocain that the strength of solution now employed in my practice is only 2 per cent, along with 0.35 per cent phenol. In so dilute a solution, the anesthetic action of cocain, although unquestionably augmented by that of phenol, is slow in becoming fully manifest, and, although I have never seen serious toxic symptoms following its employment, minor disturbances are not uncommon, in spite of the invariable practice of having the patient in a recumbent position when the application is made and during the whole course of subsequent operative procedures. With such considerations as these in mind, the favorable reports on the use of a new local anesthetic, Nupercain,* aroused much interest on my part.

Although Nupercain was introduced only about three years ago, no less than 500 papers mentioning the drug have already appeared. The majority of the reports are concerned with the use of Nupercain in general surgery for infiltration or regional anesthesia; with these we are not at present interested; consequently, no attempt will be made at an exhaustive review of the literature but attention will be directed only to those publications that have a bearing, direct or indirect, on the use of Nupercain in rhinolaryngology.

A local anesthetic should not only be effective but it should also be relatively safe. In equally active concentrations is Nupercain as safe or safer than cocain or is its use more dangerous? By experiments on lower animals, attempts have been made to answer this question; the doubtful value of the results is suggested by their diversity. Thus, for example, Uhlmann,[6] from tests on rabbits and guinea pigs, concluded that Nupercain is five times more toxic than cocain; Lipschitz and Laubender[7] state that the toxicity of Nupercain is threefold that of cocain, basing their statement on the results observed following intravenous injection into rabbits; while Bond

*Nupercain is the hydrochlorid of alpha-butyl-oxy-cinchoninic acid, is known abroad as Percain, and is issued in the U.S.A. by Ciba Co., Inc.

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and Bloom,[1] comparing the two drugs by subcutaneous injection into dogs, are of the opinion that their toxicity is practically the same when administered in this manner. It is interesting to note that the last mentioned investigators find that the absorption of Nupercain after topical application is relatively slow; this being the case, especially when the drug is introduced into the bladder or vagina, but even when a solution as strong as 10 per cent is placed in the nostrils, 15 m.gm. of Nupercain per kilogram body weight are required to cause death.[2] Assuming that the resistance of man to the toxic action of Nupercain is as great as that of dogs, this would mean that for the adult patient of average size, over a gram of the pure substance would have to be introduced into the nasal passages to bring about a fatal outcome.

A number of laryngologists abroad and a few in this country have employed Nupercain both for surface and infiltration anesthesia in the nose and throat. It is unnecessary to go into details in discussing their experiences, in view of the fact that this has been already done in a recent paper.[3] It will suffice to state most of the observers have obtained highly satisfactory results from the use of from 1.5 to 3 per cent solutions topically and 1:1000 for infiltration, with addition of suitable amounts of epinephrin. No fatalities have been reported following the use of Nupercain alone in this field in proper strength so far as I know, and the general tone of the published reports was so favorable as to lead us to make clinical trial of the new anesthetic on the rhinolaryngological service at the Polyclinic Hospital.

A certain amount of care is necessary in preparing solutions of Nupercain, because of the fact that the salt is readily decomposed by alkali; consequently, distilled water and hard glass (Pyrex or Jena) or porcelain containers should be used by preference. If it is necessary to employ tap water or to keep the solutions in ordinary glass containers, sufficient alkali may be present to cause precipitation; if it does occur from this or other factors, the addition of diluted hydrochloric acid, drop by drop, with shaking, will cause it to disappear. A very small amount of acid will usually suffice; excess will produce irritation of the tissues. Solutions of Nupercain in a slightly acid medium withstanding repeated boiling or heating in an autoclave to 15 pounds for half an hour without decomposition of the salt.

Either on topical application or after injection, the initial effect of Nupercain on the vessels is to cause dilation. This may be largely or completely prevented by addition of appropriate amounts of epinephrin.

Although a 2 per cent solution of Nupercain causes a very satisfactory degree of anesthesia on topical application to the mucosa, we found that raising the concentration to 2.5 per cent increased the rapidity of action out of all proportion to the increase in strength. Because of this and, as will be pointed out more in detail later, because the use of a solution of this concentration seems entirely devoid of danger, we have used the 2.5 per cent solution routinely in the clinic, where rapidity of action is of more importance than in private practice. For infiltration, we have used the 1:1000 solution of Nupercain with 5 minims (0.3 c.c.) of 1:1000 epinephrine to the ounce.

In the routine operative work in the rhinolaryngological clinic at the Polyclinic Hospital, Nupercain has been employed from December, 1930, to date for the induction of local anesthesia. Since December, 1931, records have been kept on the following number of cases: Submucous resection, 87; ethmoidectomy, 36; intranasal antrotomy, 29; turbinectomy, 41; tonsillectomy, 212. The technique employed is as follows:

Submucous Resection: Pledgets of cotton, saturated with 1:1000 solution of epinephrin hydrochlorid, are introduced into each nasal passage and allowed to remain for three to five minutes. Following this, the passages are cleansed by suction and pledgets of cotton, saturated with 2.5 per cent solution of Nupercain, are placed in contact with the septum on either side. It is advisable to use two of the pledgets on each side, in order to cover the septum. The pledgets should be allowed to remain in place for from five to ten minutes; after their removal, 1:1000 solution of Nupercain, containing 5 minims of 1:1000 solution of epinephrin hydrochlorid to the ounce of the anesthetic solution, is used for infiltration. With a 1 c.c. tuberculin syringe and a .26-gauge 3-inch needle, the first injection is made at the junction of the septum and palate, as far posterior as possible. A second injection of 1 c.c. is made high posteriorly, to anesthetize the nasopalatine nerve; and a third one, of the same amount, high anteriorly, to block the branch coming from the ophthalmic division of the fifth nerve. Finally, 1 c.c. is used on each side to infiltrate the mucocutaneous junction. We find it advantageous to use the circular cutting instrument, described in 1918, in order to secure drainage after this operation and eliminate the necessity for packing.[4]

Ethmoidectomy: The nasal mucosa is shrunk with epinephrin and the passages cleansed by suction as preceding submucous resection. Pledgets of cotton, saturated with 2.5 per cent Nupercain, are placed

above middle turbinate and also in the middle meatus. These are left in 10 minutes. Using 1:1000 Nupercain with epinephrin and a 1 c.c. tuberculin syrine as above, 1 c.c. of the solution is used for sphenopalatine injection by the posterior palatine route. The pledgets are removed and 1 c.c. of the 1:1000 Nupercain solution injected; half at the anterior and half at the posterior attachment of the middle turbinate. Two c.c. more of the anesthetic solution suffice for injection of the ethmoid cells, multiple punctures being made.

Intranasal Antrotomy: Shrinkage of the mucosa and cleansing as in the preceding. Pledget of cotton, saturated with 2.5 per cent Nupercain, placed in inferior meatus, extending from anterior to posterior attachment of inferior turbinate. This is left in for five to 10 minutes; on its removal, about 1 c.c. of the Nupercain-epinephrin solution is used for infiltrating the anterior attachment and along the superior border of the inferior turbinate. The inferior turbinate is infracted upward and the inferior meatus infiltrated with 2 c.c. of the same solution.

Turbinectomy: Pledgets of cotton, saturated with the 2.5 per cent solution of Nupercain, are placed above and below attachment of turbinate and left in position for five minutes. Epinephrin is not employed.

With the 2.5 per cent solution of Nupercain, the onset of anesthesia is rapid and has uniformly been of a most satisfactory nature; not only as regards depth but being much more prolonged than that induced by cocain. We have noted no undue tendency toward bleeding; either during or subsequent to operation. No evidence of local irritation nor delay in healing has been seen in our patients.

Especially noteworthy has been the complete absence of any signs of systemic intoxication, even of a mild nature, in our series of almost 200 patients who have been subjected to anesthesia by application of the 2.5 per cent solution of Nupercain. There seems full justification for the belief that Nupercain should completely replace cocain for surface anesthesia in rhinolaryngology; it is fully as effective in concentrations which are entirely devoid of danger. From our own observations and from those reported in the literature, I am convinced that serious intoxication from topical application of appropriate concentrations of Nupercain in the nose and throat is a possibility so remote as not to deserve serious consideration.

Tonsillectomy: The throat is first sprayed with 2.5 per cent solution of Nupercain twice, at one-minute intervals; or the same solution is applied four times on cotton-tipped applicators. Using a total

of about 15 c.c. of the 1:1000 Nupercain-epinephrin solution, the following procedure is employed:[5]

Through a single puncture, located on a line tangent to the crown of the last lower molar and 1 cm. behind it, the entire anesthesia is produced. The needle is introduced, directed backward and slightly outward, with the bevel facing outward, so as to produce an early bleb and later to depost the solution in the peritonsillar tissue. The bleb should be large, covering the entire anterior surface of the anterior pillar. The needle is advanced, as mentioned, infiltrating its course a distance governed by the anteroposterior dimension of the tonsil. The needle is guided by the fascial plane between the capsule of the tonsil and the superior constrictor muscle. Deviation from the correct course may be determined by rotation of the tonsil on its vertical axis when the needle impinges upon the capsule. The infiltration is continued without withdrawing the needle until the posterior pillar has been reached and infiltrated. The procedure is then performed on the opposite side. Usually the left tonsil is first anesthetized.

Our results following the use of this form of anesthesia have been fully equal to those obtainable by the employment of 1 per cent solution of procain hydrochlorid. The delay in onset of anesthesia, reported by some authors, has not been observed in a single instance in our series. Anesthesia has been uniformly satisfactory and, as after topical application of 2.5 per cent solution of Nupercain, no evidence of toxic reaction has been noted.

The duration of anesthesia following infiltration with 1:1000 solution of Nupercain is distinctly greater than that from 1 per cent solution of procain hydrochlorid; lasting, in one of our cases, 20 hours. This is a matter of some practical importance; during the persistence of the anesthesia, there is less tendency on the part of the patient to clear his throat and, consequently, a diminished tendency toward postoperative bleeding. Until now we have not made use of Nupercain in major operative work, such as laryngectomy and external sinus operations, as we thought it best first to establish the safety of this new anesthetic in the minor surgical field, before employing it in major surgical procedures. It would seem that its use in laryngectomy, particularly, would be advisable because the prolonged anesthesia which it produces gives the surgeon ample time satisfactorily to complete his operation. For radical operation on the maxillary sinus, Nupercain should be useful for producing nerve block as described in an earlier paper.[6] The concentration should be 1:500 Nupercain with 5 minims (0.3 c.c.) epinephrin to the ounce.

SUMMARY.

In 2.5 per cent concentration, Nupercain has proved to be a most satisfactory agent for causing topical anesthesia prior to such operations as submucous resection; ethmoidectomy; intranasal antrotomy; turbinectomy; and similar procedures.

The 2.5 per cent solution of Nupercain produces prompt, effective and prolonged anesthesia without signs of local irritation or of systemic intoxication.

When used in 1:1000 solution with epinephrin, Nupercain has been found fully as effective as 1 per cent solution of procain hydrochlorid for infiltration anesthesia prior to tonsillectomy.

Nupercain has the advantage over procain for infiltration, in that the duration of the anesthesia produced by the former far exceeds that following injection of the latter; as a consequence, the tendency for postoperative bleeding is less when Nupercain is used as the anesthetic agent.

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330 Park Avenue.

CONGENITAL CYST OF THE LARYNX.

Dr. Alvin J. Lorie and Dr. Paul Lux, Kansas City, Mo.

Congenital cyst of the larynx is one of the rarest conditions encountered in laryngology. Review of the literature reveals but six cases. Solomon (*Zeitschrift fur Ohrenheilk.*, Bd. 62, S. 49) reports a case of an epiglottic cyst in an infant, age 28 days, with a bad prognosis. Chamberlain (The Laryngoscope, Aug., 1917) reports a congenital cyst in the right aryepiglottic fold. Porak (*Paris Journal of Pediatrics*, 1902) reports a cyst of the aryepiglottic fold discovered at necropsy; Greene (The Laryngoscope, 1907), three cases of cysts of the epiglottis causing death in the newborn.

We wish to report a case of congenital cyst of the larynx. Master H. C., age 4½ months, Independence, Kan., referred March 25, 1932, by Dr. Philip Astrowe.

This patient had never audibly cried. At the age of about three weeks he started having spells of dyspnea, followed by regurgitation of feedings. These attacks of dyspnea had become more frequent in the last 2½ months. With these attacks and on attempting to cry he developed a marked cyanosis, a gradual loss of weight, a marked labored respiration and an increase in cyanosis. The patient had had some ultra violet and X-ray treatment without a diagnosis or results.

Examination: The child was emaciated, cyanotic, marked labored respiration with increasing cyanosis on attempting to cry. There was a marked deformity of the chest with an anterior bulging of the chest wall, a marked lateral depression of the chest wall on inspiration with a supra- and infrasternal retraction. There were some scattered rales posteriorly in both lungs. Superficial examination of the larynx revealed considerable edema, obstructed laryngeal orifice, the nature of which could not be determined at this examination.

Comment: In view of the extreme condition of the child, the inability of the child to cry aloud, the marked increase in cyanosis upon such an attempt, the marked dyspnea and cyanosis, we felt reasonably sure in making a diagnosis of an intralaryngeal growth or an intralaryngeal obstruction, and that a tracheotomy was indicated to enable us to place the child in better general physical condition for future work.

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March 31, 1932: Under local anesthesia, low tracheotomy was performed. Immediately upon completion of tracheotomy respiration became less labored and the cyanosis began clearing. No attempt was made at this time to do more. For the next six days the child's general condition improved rapidly, the feedings were retained at more frequent intervals, color and breathing became more nearly normal.

April 5, 1932: Without anesthetic, bronchoscopic examination of the larynx revealed a large cyst almost completely obstructing the entire larynx. At this time the base of the cyst could not be definitely located but was felt to be posteriorly to the left. There was a small aperture on the right side of the larynx, a mere split, through which the child had been breathing. The cyst wall was incised, collapsed, a mucoid secretion evacuated. *Diagnosis:* Congenital cyst of the larynx.

April 9, 1932: During the last two days, with the tracheotomy opening blocked, an attempt on the part of the child to cry produced sounds similar to those made by the approximation of the vocal cords.

April 12, 1932: Upon attempting to remove the tracheotomy tube, respiration became labored; patient became cyanotic.

April 14, 1932: Examination of the larynx revealed the cyst was reforming.

April 16, 1932: The tracheotomy tube in place, laryngo-fissure was performed; general anesthetic. Upon separating the thyroid cartilages a large tumor mass was seen covering entire left side of the glottic and subglottic space. This proved to be a cyst with a very broad base involving the left posterior portion of the larynx and epiglottis, probably originating from the epiglottis. The cyst wall was very thin and collapsed at the former opening. A radical procedure was attempted by removing the mucous membrane of the upper left half of the larynx and the left half of the epiglottis. The thyroid cartilages were brought together, soft tissues and muscles sutured over them, tracheotomy tube replaced. A tube was placed through the nares into the esophagus for feeding. The child made an uneventful recovery from the anesthetic. Following a stormy few days of postoperative recovery, including numerous convulsions, probably due to tetany and rather easily controlled, the child gradually improved.

April 26, 1932: Suction was employed frequently in keeping the tracheotomy tube clean and the trachea free of accumulated secretions. The child was fed through the nasal tube for four days and the tube was then removed. Following removal of the tube, even

with the epiglottis removed, with the exception of the first feeding, part of which came through the tracheotomy tube, the child handled all other feedings in a normal manner.

April 27, 1932: Tracheotomy tube was removed and the opening allowed to close.

April 30, 1932: Tracheotomy opening completely closed, laryngofissure incision healed. Patient is taking all feedings normally and is breathing in a perfectly normal manner.

May 3, 1932: Patient was discharged from hospital. All wounds healed. Patient has gained three pounds in weight, cyanosis completely disappeared. Patient told to return in a month to six weeks.

May 10, 1932: Patient returned for observation. Appearance perfectly normal, healthy baby. He has gained five pounds in weight since first admission to hospital. Deformity of chest completely disappeared. The larynx shows no evidence of return of cyst, the child cries with a husky voice.

Embryonic cysts have an epithelial lining and the cyst wall contains mucus glands. The usual location of these cysts is at the base of the epiglottis in the aryepiglottic fold, although later in life cysts may be found in any part of the larynx. The epiglottis in the region of the ventricle contains the majority of the mucus glands of the larynx and these form a more fertile field for their production. The majority of these cysts are retention cysts of these mucus glands which develop usually from an obstruction in the drainage of the mucus glands, followed by an accumulation of the secretions. The embryological type or congenital cyst may be present at birth or may develop later in life.

There have been several theories advocated as to their origin. Schneider believes that they are a form of pinch-off of the appendix of the larynx. Louys believes that they are branchiogenic in origin, one case reported having cartilage. He states that the mesodermic tissue developing this would come from the mesodermic tissue of the branchial arches. Von Kostanecke and Muleki in their work have not found that at any time during embryonic life the pharyngeal pouch comes in relation with the trachea and larynx. This would throw doubt on Louys' theory. E. Glas has pointed out that the location of embryonic laryngeal cysts is the meeting point of several germinal layers. This is not substantiated on an embryonic basis. J. C. Beck (THE LARYNGOSCOPE, 1909) brings up the question as to the origin of these cysts in thyroglossal duct tissue.

From the above literature we observe the extreme rarity of congenital cysts of the larynx. In later life they become more frequent.

The literature offers no help in the treatment of this condition, although Chamberlain's case recovered by simple incision. Since three of the above cases were discovered at necropsy the question naturally arises as to how many cases in the newborn have gone undiscovered to their death, having been mistaken for thymic death, cardiac or respiratory death.

Comment: This case is reported first, because of its rarity as we have been unable to find a similar case in the literature. Although there have been three other cases, none of the three other cases have had exactly the same type of cyst location. Secondly, it was necessary to approach the surgical end of this treatment with caution. Upon admittance the child would not have been able to have withstood laryngofissure. Tracheotomy was performed to enable the child to breathe without effort and to add to its body weight and strength. Third, simple incision of the cyst, as in Chamberlain's case, did not suffice as the cyst rapidly reformed. Due to the peculiar location of the cyst with a fixation of the epiglottis the child was unable to take feedings in the normal manner. It then became necessary to completely remove this cyst in such a manner so that it would not interfere with either respiration or nourishment. Fourth, this was accomplished by removing the greater part of the epiglottis at the base and dissecting out the left half of the larynx. Fifth, three cases have been reported found at necropsy and it is barely possible that some of the cases described as thymic death in the newborn without autopsy might be due to congenital cyst in the larynx.

Commerce Building.

AN IMPROVED POMEROY SYRINGE.*

Dr. F. W. White, New York.

The syringe I am presenting is a Pomeroy syringe with an improved semidetachable tip. The tip is so arranged that irrigating solutions may be easily drawn up into the barrel of the syringe without removing the tip or, contrawise, using excessive force to draw the solution up through the pointed tip.

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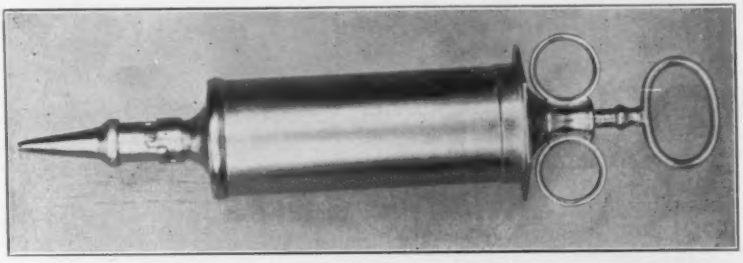

performed and the tip is securely held in place during the irrigation. The description of the procedure takes longer than the actual performance of filling the syringe. The time saved and the lessening of the amount of energy expended in one's office practice is noticeable. To a busy clinic, especially an ear clinic where many patients with impacted cerumen are treated, its value in the saving of time and labor is a great advantage.

The syringe was made for me by the Ross-Royal Co., and I am indebted to the Aug. E. Fraass Co. for loaning the cut for publication purposes.

174 West 58th Street.

*Presented before the New York Academy of Medicine, Section of Laryngology and Rhinology, March 25, 1931.

Editor's Note: This ms. received in Laryngoscope Office and accepted for publication May 20, 1931.

DR. LEWIS FISHER.

IN MEMORIAM

DR. LEWIS FISHER.

An automobile accident was responsible for the death of another prominent otolaryngologist. This time we chronicle the death of Dr. Lewis Fisher, of Philadelphia, who, together with three of his friends, was killed October 5, when returning by auto from a fishing trip in New Jersey.

Born in Russia, in 1885, Dr. Fisher came to the United States in 1897; attended school at Norristown, Pa., graduated from the Manual Training School of Philadelphia, in 1902, and from the University of Pennsylvania Medical School, in 1906. His post-graduate training in otolaryngology was received largely in the Vienna Clinics. Located in Philadelphia since 1910, he specialized in otolaryngology, was Professor of Otology at the Graduate School of Medicine of the University of Pennsylvania, was Instructor in Neuro-Otology there and Special Lecturer in Neuro-Otology at the Women's Medical College. He was Attending Neuro-Otologist at the Jewish Hospital and Attending Otolaryngologist at Mt. Sinai Hospital, of Philadelphia.

During the World War he was in charge of the Aviation Training School at Mineola, L. I., and was honorably discharged at the conclusion of the war with the rank of Major.

With Dr. Isaac H. Jones he was co-author of a book, "Equilibrium and Vertigo." His contributions to otologic literature were largely in the field of neuro-otology reflecting substantial observations, wide experience and original thought.

Besides membership in the various general medical societies, Dr. Fisher was a Fellow of the American Otological Society, the Ameri-

can Laryngological, Rhinological and Otological Society, and a member of the Board of Otolaryngology of the American Academy of Ophthalmology and Otolaryngology.

The otological profession of America has lost in Lewis Fisher a close student of neuro-otology, a keen diagnostician, a genial and kindly man whose generous impulses were a by-word with his friends and patients.

In 1916 he was married to Miss Marguerite Lazard, of Chattanooga, Tenn., who, with four children, survives him.

May we express to his family our deepest sympathy.

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M. A. G.

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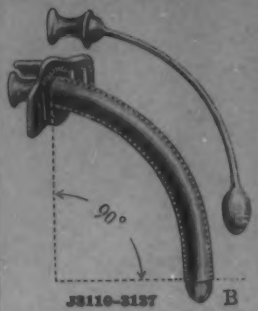

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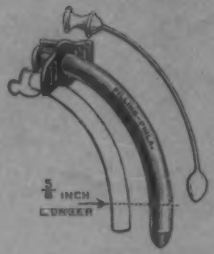

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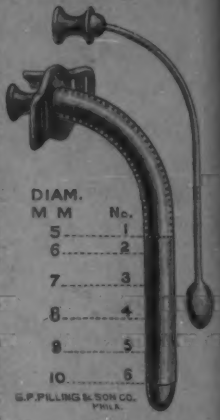
EXTRA LENGTH TRACHEOTOMY CANNULA OF CHEVALIER JACKSON'S STANDARD CURVE

For patients in whom the distance from the skin to the trachea is unusually great, whether anomalous or due to goitre or radium and X-ray reaction.

Extra length, full curve, Chevalier Jackson Tracheotomy Cannula, sizes 5 and 6, sterling silver, with pilot $9.00



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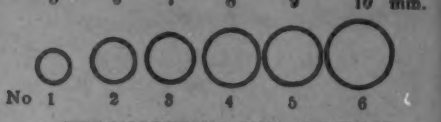
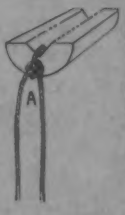


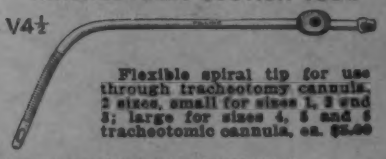
RUBBER STOPPERS FOR DECANNULATION



Rubber stoppers finished to fit tracheotomic cannula accurately. Illustrations show large bypass. Also made to give one-half closure, three-quarter closure and complete closure. With silk thread, ea. 50c

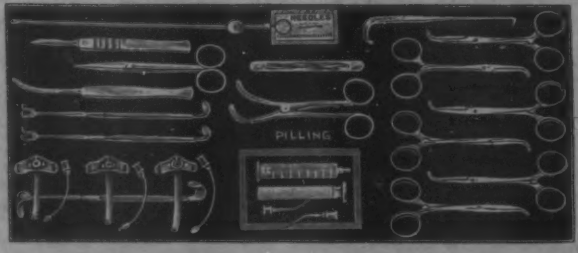
In ordering state size, and whether stopper is for inner or outer cannula.

TRACHEOTOMIC SUCTION TUBE



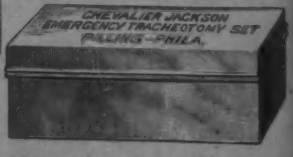
Flexible spiral tip for use through tracheotomy cannula. 2 sizes, small for sizes 1, 2 and 3; large for sizes 4, 5 and 6 tracheotomic cannula, ea. $5.00

EVERY DOCTOR SHOULD HAVE ACCESS TO THIS EMERGENCY TRACHEOTOMY SET OF CHEVALIER JACKSON INSTRUMENTS



Complete set of tracheotomy instruments safely protected in a copper case wrapped in a sterile towel and ready for immediate use; is almost indispensable—it saves time and removes all doubt. Instruments are carefully patterned after the Chevalier Jackson Tracheotomy models, and include aspirating tube, retractors, haemostats, tracheal dilator, scalpel, blunt bistoury, dissecting scissors, thymus retractor, tenaculum, suture needles, catgut and syringe.

With 2 plated tubes $30.00
With 2 silver tubes $56.75



THE GEORGE P. & SON CO. **PILLING** ARCH & 23D STS. PHILA., PA.